W National Tuberculosis

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS

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TWELFTH ANNUAL MEETING

WASHINGTON, D. C.

THE NATIONAL ASSOCIATION

FOR THE

STUDY AND PREVENTION

OF TUBERCULOSIS

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THE NATIONAL ASSOCIATION

FOR THE

STUDY AND PREVENTION OF TUBERCULOSIS

TRANSACTIONS OF THE TWELFTH ANNUAL MEETING

WASHINGTON, D. C., MAY 11-12, 1916

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS
105 EAST 22ND STREET
NEW YORK

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THE NATIONAL ASSOCIATION FOR THE STUDY AND
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The National Association for the Study and Prevention of Tuberculosis

1915-1916

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1916-1917

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TWELFTH ANNUAL MEETING

OF

The National Association for the Study and Prevention of Tuberculosis

THE twelfth annual meeting of The National Association for the Study and Prevention of Tuberculosis was held at the New Willard Hotel, Washington, D. C., on Thursday and Friday, May 11 and 12, 1916.

The president of the Association, Dr. Edward R. Baldwin, called the meeting to order at two o'clock on the afternoon of May 11. The address of the President was presented and filed for publication in the *Transactions*. The report of the Executive Office for the year ending April 30, 1916, was read and approved.

On motion from the floor, duly seconded and carried, the following committee was appointed by the Chair to present names to fill vacancies in the Board of Directors:

COMMITTEE ON NOMINATIONS

Dr. John H. Lowman, Ohio, *Chairman*
Mrs. Bethesda Beals Buchanan, Washington
Dr. Alexius M. Forster, Colorado
Sherman C. Kingsley, Illinois
Dr. Walter R. Steiner, Connecticut

Likewise on motion from the floor, seconded and carried, the following Committee on Resolutions was appointed by the Chair:

COMMITTEE ON RESOLUTIONS

William H. Baldwin, District of Columbia, *Chairman*
Dr. Robert H. Babcock, Illinois
Dr. Vincent Y. Bowditch, Massachusetts
Dr. Philip K. Brown, California
Dr. Livingston Farrand, Colorado

By unanimous vote of the members present the Secretary was instructed to send a telegram to Mrs. Theodore B. Sachs conveying the sympathy of the meeting and expressing appreciation of the great work accomplished by Dr. and Mrs. Sachs.

At the business meeting of the Association, held at noon on May 12, the following were elected directors of the Association for terms of five years:

Dr. Robert H. Babcock, Illinois
Dr. H. M. Bracken, Minnesota
Dr. Philip King Brown, California
Dr. C. E. Edson, Colorado
Miss Edna L. Foley, Illinois
Dr. Louis V. Hamman, Maryland
Dr. Henry Barton Jacobs, Maryland
H. McK. Jones, Missouri
Dr. George M. Kober, District of Columbia
R. B. Mellon, Pennsylvania
Dr. A. K. Stone, Massachusetts
Dr. Victor C. Vaughan, Michigan

Mr. William H. Baldwin, Chairman of the Committee on Resolutions, presented the following resolutions with the endorsement of the Committee. They were unanimously adopted by the general meeting:

1. *Metropolitan Life Insurance Company.*

Resolved, That The National Association for the Study and Prevention of Tuberculosis express its hearty appreciation of the generous proposition of the Metropolitan Life Insurance Company to contribute $100,000 for conducting a community experiment in the control of tuberculosis.

In undertaking this trust the Association hopes that the results of the experiment may be commensurate with the desires which inspired the offer.

2. *Prudential Insurance Company.*

WHEREAS, the Prudential Insurance Company of America has recently issued an elaborate statistical treatise on the mortality from cancer throughout the world, in the furtherance of the cause of cancer control, under the auspices of the American Association for Cancer Research and the American Society for the Control of Cancer; and

WHEREAS, a corresponding treatise on the mortality from tuberculosis throughout the world, with a due consideration of the various medical and sociological aspects of the tuberculosis problem, would aid materially all those who throughout the country are engaged in the study and prevention of tuberculosis; and

WHEREAS, heretofore no collective study of tuberculosis statistics of this world-wide problem in preventive medicine has been made, either under the direction of government or private enterprise; be it

Resolved, by the National Association for the Study and Prevention of Tuberculosis, in annual meeting assembled, that it be respectfully suggested to the President and Board of Directors of The Prudential Insurance Company of America that the said Company cause to be prepared, and make available for gratuitous distribution to those interested in the subject, a work on the mortality from tuberculosis throughout the world corresponding to the recently issued volume on the mortality from cancer; and be it further

Resolved, That the Association desires to place on record its appreciation of the active interest on the part of The Prudential in the campaign against tuberculosis.

3. *In Memory of Dr. Trudeau.*

WHEREAS, the death of Dr. Edward Livingston Trudeau the physician, philanthropist, scientist and first president of the Association, removes from us the leader in the sanatorium movement in America, one of the founders of this body, and an exponent of humanitarian principles of the highest order, and

WHEREAS, in the life history of this unique man, Providence has given to us in a gifted and lovable personality an example of rare usefulness in the face of adversity, an inspiration to those whom Fate leads to tread the same road of invalidism, and a nobility of character developed as a result of suffering, a sympathy deepened and made invaluable to the world by personal experience of disease throughout a long life, and

WHEREAS, in the history of American medicine, there existed no finer example of the ideal physician, whose influence radiated far beyond his home in the forest, whose memory will be cherished by the strong and the weak, by the grief-stricken and disheartened in their struggle for life, whose comfort he was, whose presence brought faith and hope to the bedside, and who made an undying impression on the art and science of medicine in the field of tuberculosis, be it

Resolved, That this Association records these sentiments with a full consciousness of the debt we owe to his memory and a deep appreciation of the glory shed upon his work as well as upon the history of American medicine, and be it further

Resolved, That a copy of these resolutions be sent to the family of the late Doctor Trudeau.

4. *In Memory of Dr. Sachs.*

WHEREAS, in the death of Dr. Theodore B. Sachs, The National Association for the Study and Prevention of Tuberculosis has suffered the loss of its honored president, and the entire anti-tuberculosis movement a valued worker; and

WHEREAS, in a spirit of self-sacrifice and devotion to the cause of humanity he has given the best of his life to the anti-tuberculosis campaign; and

WHEREAS, his signal services in tuberculosis work, both as a clinician and an administrator, have proven of inestimable worth to the people of the United States and the rest of the world; be it

Resolved, That the National Association for the Study and Prevention of Tuberculosis deplores its own loss of a member, director and president, and expresses its deep and sincere appreciation of the valuable services Dr. Sachs has rendered; and be it further

Resolved, That a copy of these resolutions be read at and spread upon the minutes of the Twelfth Annual Meeting of The National Association for the Study and Prevention of Tuberculosis, and that they be transmitted by the Executive Secretary to the family of Dr. Sachs.

5. *In Memory of General George M. Sternberg.*

WHEREAS, in the death of General George M. Sternberg, this Association has lost one of its most highly valuable members, eminent for his services as an executive officer and for his attainments in medicine, as one of the leaders in the movement against tuberculosis and a co-worker with Dr. Robert Koch, and as one of the founders of this Association, be it

Resolved, That the secretary be requested to extend to his family the deep sympathy of the members of this Association, while expressing their appreciation of him, both as a man and a physician.

6. *In Regard to Senate Joint Resolution* 120.

WHEREAS, the Senate Joint Resolution number 120, introduced into the United States Congress on April 11, 1916, makes it unlawful for any officer or employee of the Public Health Service of the Federal Government to be or become a member or officer of, or in any way connected with any medical or private health association or organization of any kind, and

WHEREAS, in the opinion of The National Association for the Study and Prevention of Tuberculosis the spirit of said resolution is opposed to the aims and objects for which the Association was formed, and its passage would seriously interfere with the progress of the anti-tuberculosis movement in the United States, there be it

Resolved, That the National Association for the Study and Prevention of Tuber-

culosis records its absolute disapproval of said resolution and urges its members to take such steps as may be proper to prevent its adoption by the United States Congress.

7. In Regard to Medical Education.

WHEREAS, in the past the tendency of general hospitals has been to exclude cases of tuberculosis, and

WHEREAS, it has been demonstrated in a number of such institutions that this class of cases may be admitted into separate wards without detriment to other patients, and

WHEREAS, both for humanitarian reasons and for purposes of instruction, there is need for a change of policy in this regard, therefore be it

Resolved, That The National Association for the Study and Prevention of Tuberculosis recommends to general hospitals through both their medical and lay boards, that separate wards, one for each sex, be established for the care of such cases.

The report of the Committee on Nursing Education was received and accepted with thanks to the Committee for their labor upon it. The report is printed elsewhere in this volume of *Transactions*.

At a special meeting held on the afternoon of May 12th the report of the Committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children was discussed and referred back to the Committee for further consideration. The report and discussion are printed elsewhere in this volume of *Transactions*.

At a meeting of the Board of Directors held on Friday, May 12, the following officers were elected for the ensuing year:

Dr. Edward R. Baldwin, New York, *President*
Theodore Roosevelt, New York, *Honorary Vice-President*
Sir William Osler, Oxford, *Honorary Vice-President*
Dr. Watson S. Rankin, North Carolina
Dr. James Alexander Miller, New York } *Vice-Presidents*
Dr. Henry Barton Jacobs, Maryland, *Secretary*
William H. Baldwin, District of Columbia, *Treasurer*.

The following Directors were elected to serve on the Executive Committee for the ensuing year:

William H. Baldwin, District of Columbia
Dr. Herman M. Biggs, New York
Homer Folks, New York
John M. Glenn, New York
Sherman C. Kingsley, Illinois
Dr. David R. Lyman, Connecticut
Dr. George T. Palmer, Illinois

REPORT OF THE TREASURER

The National Association for the
Study and Prevention of Tuberculosis,
No. 105 East 22nd Street, New York.

New York, May 8, 1916.

Dear Sirs:

In accordance with the request of Mr. C. M. Clark, Office Secretary, we have made an audit of the Cash account of the Treasurer of your Association for the year ended April 30, 1916.

The following is a correct summary of the cash transactions for the year as recorded in the cash book:

Balance, May 1, 1915	$ 3,043.16
Receipts	53,431.59
Total	$56,474.75
Disbursements	45,546.27
Balance, April 30, 1916	$10,928.48

Certification of the cash on deposit April 30, 1916, was obtained from the American Security & Trust Company, of Washington, D. C.

The cash in the hands of the Assistant Secretary, which is not a part of the cash book balance, was counted on May 4, 1916; and taking into consideration disbursements amounting to $332.83, for which reimbursing check had not been received from the Treasurer, the fund of $777.36 was proven.

Very truly,

HASKINS & SELLS,
Certified Public Accountants.

RECEIPTS

Balance on hand, May 1, 1915		$ 3,043.16
Dues of members	$10,435.00	
Donations	1,267.30	
Appropriation from Russell Sage Foundation	9,250.00	
Red Cross Seals	14,000.00	
Refund of expenses of Red Cross Seal Campaign	358.81	
Appropriations for Field Secretary	780.00	
Sale of books, pamphlets, etc.	615.66	
Sale of tuberculosis week literature	666.54	
Sale of lantern slides and photographs	72.50	
Sale of cuts, boiler plate, matrices, etc.	528.35	
Sale of office equipment	31.00	
Interest on bank balance	159.81	
Refund of traveling and field work expenses	509.33	
Rental received from sub-lease	360.00	
Miscellaneous refunds	452.83	
Sale and rental of motion picture films	450.17	
Sale of Red Cross Seal Literature, Medals, etc.	1,802.50	
Red Cross Seal Mail Sale Suspense	6,200.63	
Montana Red Cross Seal Sale	1,715.44	
Nevada Red Cross Seal Sale	562.76	
Utah Red Cross Seal Sale	1,865.74	
Wyoming Red Cross Seal Sale	1,347.22	
		$53,431.59
		$56,474.75

DISBURSEMENTS

Rent	$ 1,955.96
Storage	240.00
Salaries	12,954.96
Clerical Assistance	3,662.95
Printing Transactions of eleventh annual meeting	1,305.51
Printing special studies	143.82
Printing Press Service	148.94
Printing Bulletin	434.46
Journal of the Outdoor Life subscriptions	1,688.96
Miscellaneous reprints, pamphlets and circulars	499.40
Stationery	346.22
Tuberculosis Week Campaign	698.81
Field work and traveling expenses	3,648.15
Expenses of sectional conferences	573.55
Postage and express	2,225.45
Telephone service and telegrams	402.24
Incidental expenses	338.49
Office supplies	403.93
Furniture and office equipment	188.68
Distribution of Transactions	208.20
Reporting eleventh annual meeting	122.50
Auditing of accounts	22.00
Clipping Service	122.57
Advertising	23.00
Motion picture campaign	982.18
Red Cross Seal Campaign expenses	550.99
Lantern slides and photographs	73.29
Cuts	312.58
Labor Committee	41.73
Special Pamphlet Committee	44.96
Information File	134.60
Red Cross Seal Mail Sale Suspense	7,922.23
Office Library	30.97
Red Cross Seal Literature, Medals, etc.	1,825.23
Institute for Tuberculosis Workers	9.00
Boiler Plate and Matrix Service	311.17
Exhibition Material	147.00
Committee on Research	37.00
Medical Examination of Employees	72.00
Book Marks	128.40
Percentage to American Red Cross on Seal Sale	535.70
Printing Directory	28.49
	$45,546.27
Balance on hand, April 30, 1916	$10,928.48

WILLIAM H. BALDWIN, *Treasurer.*
NEW YORK, May 8, 1916.

Contributors to the funds of the Association for the year May 1, 1915, to April 30, 1916, were:

John D. Rockefeller
Edward S. Harkness
Samuel Mather
James Douglas
Mrs. Stephen V. Harkness
Adolph Lewisohn
William A. Read
Rt. Rev. Frederick Courtney
Arthur B. Emmons
George W. Gensemer
John W. Auchincloss
William P. Bancroft
J. C. Havemeyer
Mrs. Joseph Howland
William Henry Nichols
Mrs. Ezra R. Thayer
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Dr. Edward R. Baldwin
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ADDRESS OF THE PRESIDENT

It is my privilege to greet you at the opening of the Twelfth Annual Meeting of The National Association for the Study and Prevention of Tuberculosis.

In a world full of turmoil elsewhere we have not felt this work retarded or set backward by the cruel hand of war. The anti-tuberculosis campaign, like many other flowers of civilization, can thrive only amid peaceful conditions.

Therefore it should be with anxious hearts that we contemplate the possible effect on this worthy movement of the participation of our country in the conflict. God forbid that the humanitarian cause to which this Association is committed should be abandoned because of a still louder call which the distinguished President of the United States has clearly indicated.

Without question the past year has cast a heavy shadow upon the world at large which no material prosperity can banish. Our duties will surely be multiplied in our own field in the aftermath of war. The immense problems of relief work in the warring countries overshadow everything else at present. All the more reason, therefore, that we should be grateful no serious check to the tuberculosis cause has occurred. On the contrary, the support of institutions and the educational campaign have steadily progressed. We have, nevertheless, suffered losses. Two of our leaders have passed beyond the vale. America's Beloved Physician and the inspiration of the best that we know, Dr. Edward L. Trudeau, was the first to leave us. He died, but after a full life of effort to do more, and to leave better hope for the tuberculous. His was a spiritual leadership in the best sense; the personal experience of invalidism was his greatest appeal, and the impress of nobility on his face was also natural to his soul, and was powerfully aided by a close touch with sorrow and disease. This spirit was so mingled with a happy temperament and fondness for the simple pleasures, and human companionship, that we who knew him well cannot forget the support he gave to us in times of despondency. As the first president of the Association, he gave an inspiration at once to the cause. It cannot be that such an influence shall cease when the passing years bring brighter days for the sufferers from this scourge.

Another devoted servant of this great cause has left us with tragic suddenness. Dr. Theodore B. Sachs (by whose death I occupy this unexpected place before you), gave all of his strength, and life itself, to the city of Chicago for the help of the unfortunate tuberculous poor. Born and bred under hardships, sensitive and idealistic, he put his whole soul

into a great work: This was the proper care and treatment of the tuberculous people of Chicago. He organized a model sanatorium and dispensaries, he set on foot an admirable system of examinations of employees of the large industries in a great city, and he did this with the handicap of a foreign birth. He shamed the too-often-complacent native Americans by his enthusiasm for the democratic ideals and accomplished a work and achieved a name that will justly be honored in his adopted home and elsewhere. His life was given to protest most effectively against the lowering of the standards he had set for the institutions by the introduction of spoils politics into the management. His mold was heroic, and the revulsion of feeling that followed his supreme sacrifice is now bearing fruit in a memorial hospital to be built for the tuberculous. Let it be a valuable lesson to the entire country that we must protect these public institutions when they are properly, efficiently, and also *humanely* conducted from the blighting influences of changes in the city or State government.

The influence of this Association may do much to create a sentimental attitude as well as a practical one, toward public institutions for the tuberculous. It cannot be gainsaid that this sentiment is increasingly needed and has not been sufficiently evident in some places. The death of two such devoted examples of humanitarian idealism makes our duty all the more binding lest this aspect of the relief of tuberculosis be weakened by the increasing number of politically dependent institutions.

I now ask you to review the significant developments of the anti-tuberculosis effort during the past year. First, a few words about the educational campaign:

EDUCATIONAL CAMPAIGN

The stage of mass meeting lectures, posters, and the more sensational methods of publicity before large audiences has given place to *intensive* efforts in schools, churches, country districts, etc. Health talks, especially before children, motion pictures, stock lectures, and class room instruction are now the vogue in recent campaigns. Special attention has been given to the education of labor unions and groups of working men by articles in their papers. Reports on tuberculosis are made from local organizations, which enlist the interest of the large membership of these influential bodies. An active movement has been inaugurated for the better instruction of medical men, both in the medical schools and in post graduate courses. A committee on Medical Education has been agitating this subject, and it is believed progress has been made. Another committee has in charge the preparation of a much needed "Handbook on Tuberculosis for Medical Practitioners," which will shortly be published. During this session of the Association a special Symposium on Medical Education will be held. The general trend is toward more accurate methods in medicine than were possible in the first years of the campaign, and the physicians are devoting more attention to the subject everywhere. The coming demand for medical examina-

tions for employees of the large industries is another stimulus for physicians to perfect their knowledge, and the Association has fostered this movement.

ADMINISTRATIVE ACTIVITIES

The most important thing that has been done in the administrative field of tuberculosis by the Association has been the effort to standardize the methods of associations, dispensaries, and relief agencies through its Institute for Tuberculosis Workers and by its Sectional Conferences. In this way the experience of the Association's staff is placed at the disposal of the locality visited as well as training given to new workers. Here again is shown that the demand for efficient performance is insistent in the public health work as in every other department of life.

THE INTERSTATE CONTROL OF TUBERCULOSIS

During the past year as never before, has the interstate character of the tuberculosis problem been brought to the fore. The activity of the United States Public Health Service, the California State Board of Health, The National Association for the Study and Prevention of Tuberculosis, and other groups is bringing to the public a recognition of the fact that tuberculosis cannot be finally controlled except by cooperation of the federal government. Such projects as the Kent Federal Subsidy Bill, a division of tuberculosis in the United States Public Health Service, or a federal commission on tuberculosis, all of which will be discussed before the Sociological Section at this meeting, are only indications of the national interest being taken in this phase of the tuberculosis problem.

RESEARCH IN TUBERCULOSIS

The feeling has been spreading that more study into the many-sided questions that are yet obscure in relation to tuberculosis is needed. These are both medical and sociological problems. On the medical side the advance of the educational campaign was more rapid than accurate knowledge justified; the consequence is that some things have been stressed as facts that were only assumptions. This has been true of the alarming statements about the danger of infection. There is need of systematic and sustained effort over a period of years in the study of this question. Only by means of liberal support from private or public sources can any real advances be made. A Research Committee was appointed by the Directors in October of last year whose report will be given in the Pathological Section. In a general way it deals only with laboratory researches, but there is need of further study of the social causes and relations of tuberculosis to other diseases, for example, before going further into expenditures for elaborate institutional care. The tuberculosis research that is now being done in laboratories, with one or two exceptions, is of a transient character, contributing but little to the store of knowledge. There is

or has been but little laboratory work reported to the Committee that was supported; it has been done in most cases by volunteers with little or no experience. While of interest to those who have the taste for it, it does not have the serious aspect that should pertain to an important and rational way of attacking the problem of the prevention and cure of the disease. The various universities and colleges that have facilities, and are desirous of doing this work, have not the means, and in most cases have not the workers who care to undertake the experiments. The progress, therefore, is slow. During the past year no very notable contributions to the knowledge of tuberculosis have appeared in America. The work in all the foreign laboratories is diverted to the practical needs of war. It is likely to be suspended or retarded for years in those countries to which we have looked heretofore for advances in medicine. At most there have been efforts to improve the methods of early diagnosis by means of the blood. Of fundamental importance is the discovery of some means of differentiating at the earliest possible moment the actively progressive disease from the quiescent or arrested state of the disease. This awaits further research; likewise the question of childhood primary infection and secondary adult infection, if such is the natural sequence. Much depends upon the solution of these two questions, as well as the development of improvements in treatment looking to a specific of value. Is it too much to ask that we should have the means for the discovery of a really scientific method of diagnosis and treatment of tuberculosis to say nothing of prevention, if by thorough study it might be accomplished?

FINANCIAL STATEMENT

A few words may be added about the financial condition of the Association. The most encouraging thing about the support of the anti-tuberculosis crusade is the increased sale of the Red Cross Seals. The memberships continue, but increase but slowly, largely because there is little effort made to enlist new members. Against this the fact is encouraging that more and more money is being spent out of public funds, Federal, State, County, and Municipal. The aim of the various associations is to make the public understand and assume its rightful burden in the care of the consumptives, especially institutional and nursing care. In the last ten years the amount of money spent annually in the anti-tuberculosis campaign has increased from $5,000,000 to $22,500,000, and the expenditure from public funds has increased from 25 per cent. to 65 per cent. How much has been spent for research worthy the name during the same period has not been estimated, but a reasonable guess would be less than $25,000 during the past year. Moreover the point has been arrived at where further interest must be aroused to sustain the cherished hopes of those who believed that it was an easy matter to root out the disease by the measures now in vogue. Doubtless they were wrong in taking such a superficial view, but they

may with justice look for improved methods and better results in the prevention and treatment than we now possess. It is therefore with the greatest pleasure that I am permitted to announce that one of the great life insurance companies has tendered to this Association $100,000 for a three years' experiment. It is not a laboratory experiment (for not all experiments are done in laboratories), but an attempt to rid an entire community of tuberculosis by the complete control of all the cases of that disease that shall be found after a survey. The details are not yet planned, nor has the proposed community — preferably of 5000 inhabitants — been selected.

It is needless to say that this proposal opens new avenues of usefulness for the Association and includes the prospect of merging many other public health problems in its program of action.

RELATION OF TUBERCULOSIS TO OTHER PUBLIC HEALTH MOVEMENTS

As time goes on one is forced to see that tuberculosis is indeed only one of these problems, and they must all be considered in the general campaign for physical and moral betterment. At the present time the anti-tuberculosis campaign is probably the best organized and most efficient public health movement in the United States. It is this very fact that is just now raising two very difficult administrative problems: (1) What should the anti-tuberculosis association do in regard to such problems as housing, child welfare, infant mortality, alcoholism, etc? and (2) Is it time for the local and State anti-tuberculosis societies to expand their scope and to become general public health organizations?

As to the first question, there is a growing conviction that such factors as bad housing and industrial conditions have a vital bearing on tuberculosis and that the anti-tuberculosis societies should either lead or cooperate in movements along these lines. The leadership which the anti-tuberculosis campaign has taken in the open-air school movement, not for the tuberculous alone, but for anemic and even normal children, is an evidence of the way in which the question can be answered. If there is no other to do the necessary work, the anti-tuberculosis association should do it.

As to the expansion of scope of anti-tuberculosis societies, the leaders of this movement would be blind indeed if they did not sense the inevitable development in that direction. The anti-tuberculosis campaign must give way in leadership some day to a fully coordinated public health movement, but it takes all the wisdom, counsel, and experience available to determine now whether the time is right for every community. Possibly now we are in a transition stage of development. While tuberculosis is a disease of many ramifications, it is, after all, only one of many other public health problems. It is to be hoped that the control and prevention of tuberculosis can successfully be coordinated with the many other movements for health and social betterment.

REPORT OF THE EXECUTIVE OFFICE FOR THE YEAR ENDING APRIL 30, 1916

The year just closed has shown in a number of ways increased interest and activity in the anti-tuberculosis movement. For example, new organizations have been formed in Oregon, Iowa, Florida and Idaho, and plans for similar organizations have been formulated in Utah, Nevada, Montana, Wyoming, New Hampshire and Vermont.* Besides this, the many anti-tuberculosis associations scattered throughout the United States have given hopeful indications of the extension of their work in their several territories. The new Tuberculosis Directory of the National Association about to be published will list more than 3100 different agencies, including over 1300 anti-tuberculosis Associations and committees, nearly 600 tuberculosis hospitals and sanatoria, about 450 dispensaries and clinics, more than 300 open air schools and a variety of additional agencies.

The decade ending with the year 1914 gives an opportunity to compare the mortality from tuberculosis at the time the National Association started and at present. The last figures of the Federal Census show that the death rate has declined from 200.7 per 100,000 population in 1904 to 146.8 in 1914 in the registration area — a decline of more than 25 per cent. Figures recently compiled for the National Association by the Prudential Life Insurance Company show that in thirty of the largest cities of the United States, scattered in every part of the country, the death rate from tuberculosis has declined on an average from 23.5 per 10,000 population to 18.8, or 20 per cent. In some cities the rate of decline has been more than 30 per cent., while in others, as might be expected, it has not been so rapid; but in practically all of these cities there has been a substantial decline in the death rate. While it would be presumptuous to attribute this decline in the death rate directly to the anti-tuberculosis campaign, the United States Bureau of the Census in commenting upon the fact says, "As a result of a more general understanding of the laws of health, the importance of fresh air, etc., due in part no doubt, to the efforts of the various societies for the prevention of tuberculosis, there has been a most marked and gratifying decline during recent years in the mortality from this scourge of civilization."

To what degree The National Association for the Study and Prevention of Tuberculosis has contributed to this general progress during the past year may be indicated by this account of its work. A number

* Since this report was presented, Associations have been formed in Utah, Montana, Nevada, Wyoming, Vermont, and New Hampshire.

of the principal activities of the Association will be presented in brief detail.

PUBLICITY

The publicity work of the Association during the past year has been more varied than ever before. In addition to twenty regular Press Bulletins, the Association has carried on special publicity campaigns, both during the Red Cross Seal and Tuberculosis Week movements, and also during the sectional conferences and at the time of the annual meeting. The publicity material has been more varied in character, including not only the regular slip service, but, in addition, plates, matrices, special feature stories, and special copy of various kinds. The newspapers, magazines and various large news syndicates have continued their generous cooperation with us and have contributed much to the success of the campaign.

Twelve monthly Bulletins of the Association have been published during the past year. This Bulletin is coming to be one of the most valuable and popular forms of literature issued by the Association. It is a monthly handbook of instruction and suggestion to the anti-tuberculosis worker, and is acting continuously as a clearing house for ideas from various parts of the field. Recently the scope of the Bulletin was extended, and in addition to the regular technical articles for lay workers, a series of special medical notes, news and abstracts are being published. These have apparently met with an instant cordial reception. The number of pleasing comments which the Association has received on this and other phases of the Bulletin is most gratifying.

The special Labor Press Service inaugurated a little over a year ago has been continued, nine special Bulletins having been issued. These Bulletins are sent to various labor papers of the country.

FIELD WORK

The field work of the National Association has given the Executive Office an opportunity to project itself into various parts of the country where its influence and services were most needed. Continuing the policy adopted some time ago, the field secretaries have rendered most of their services in those States where the anti-tuberculosis campaign was not well organized, with the idea of stimulating or reorganizing the work. During the year which has just closed, our field secretaries, Mr. DeForest and Mr. Hopkins, have visited and worked in thirty different States as follows: Illinois, Wisconsin, Iowa, Minnesota, Idaho, Oregon, Washington, California, Missouri, Nebraska, Indiana, Michigan, Kentucky, Ohio, Maine, New Hampshire, Vermont, Colorado, Utah, Nevada, Virginia, South Carolina, North Carolina, Florida, Alabama, Louisiana, Arkansas, Tennessee, Mississippi and Georgia. In each of these States a certain amount of routine field work has been undertaken. As a result, new State organizations have been formed in Oregon, Idaho, Iowa and Florida. The Association has been instrumental in

assisting in reorganizing in the work in Illinois and in greatly stimulating the work in South Carolina, Missouri, Tennessee, Virginia and other States. As a result of plans formulated during the Red Cross Seal Campaign of 1915, Mr. DeForest is now at work on the organization of new State associations in Utah and Nevada and plans later to form similar associations in Montana and Wyoming. It is planned to reorganize the work also in Vermont and New Hampshire. In addition to the definite field work of Mr. Hopkins and Mr. DeForest, both Dr. Hatfield and Mr. Jacobs have had occasion to do a considerable amount of traveling for the purpose of consulting and advising with local and State representatives. Together they have visited more than a dozen different States and twenty-five or more different cities.

It is significant to note that most of the States visited are in the South, Middle West and Western part of the United States. The value of the field secretaries' services to these States in increased revenue from the Red Cross Seal Sale, and in increased interest in the anti-tuberculosis campaign, can hardly be estimated.

SECTIONAL CONFERENCES

During the past year four sectional conferences were held under the auspices of the National Association: the New England Conference at Springfield, Mass., the North Atlantic Conference at Albany, the Mississippi Valley Conference at Indianapolis, and the Southern Conference at Columbia, S. C. All of these conferences were well attended, the aggregate attendance of the four of them being over twelve hundred.

For the year 1916 it is planned during the month of October to hold five conferences: the New England Conference at New Haven, October 12 and 13; the North Atlantic Conference at Newark, N. J., October 20 and 21; the Southern Conference at Jackson, probably on October 2 and 3; the Mississippi Valley Conference at Louisville on October 4, 5 and 6, and the Southwestern Conference at Albuquerque, October 12 and 13. These sectional conferences are proving of great value in bringing into definite affiliation with the anti-tuberculosis movement workers who would not otherwise be interested, and also in stimulating the interest of those who are already engaged in active work.

RED CROSS SEALS

The total sale of Red Cross Christmas Seals for 1915 will aggregate 80,000,000 seals. This is an increase from the 55,000,000 sold in 1914 of over 45 per cent. Never before in the history of anti-tuberculosis work in the United States has the interest in this movement been so widespread or keen as during the holiday season of 1915, due in part at least to the Red Cross Seal Sale. The educational value as well as the monetary value of the campaign has been shown on every hand.

Already the printing of 300,000,000 seals for 1916 is under way and the organization plans for the campaign of next Christmas are well developed. The National Association through Mr. DeForest, acting as

national sales manager, extends its service to every agent, State and local, who needs advice and assistance. Only those who have been through a seal sale can appreciate something of the energy and time involved in conducting a campaign which will involve the distribution and possible sale of 300,000,000 seals in a territory extending from the Philippine Islands to Porto Rico and from Alaska to the Canal Zone.

TUBERCULOSIS WEEK

Complementing the Red Cross Seal Sale during the holiday season of 1915 was the Tuberculosis Week Campaign. Without question this was the most widely observed public health movement that has ever been observed in the United States. It is impossible to secure accurate and reliable reports as to its extent, but from various channels, the executive office has been apprised that either part or all of the week was observed in almost every section of the United States. Three special features were emphasized during Tuberculosis Week — Medical Examination Day, when stress was laid on periodical physical examination of every one; Children's Health Crusade Day, a special day for the children in the schools, and Tuberculosis Sunday, continuing the idea of interesting the churches in tuberculosis work. There has been some opposition to coupling the Tuberculosis Week Campaign so closely with the Red Cross Seal Campaign; but while it means increased work for a short time for all anti-tuberculosis associations, in most localities it is felt that the intensifying of educational methods within this comparatively short period of a few weeks is more beneficial than the extending of special campaigns to different seasons of the year. While plans for the 1916 campaign have not yet been completed, Tuberculosis Week will probably be held slightly earlier than last year, possibly during the week of December 3 to 10.

SPECIAL STUDIES

a. *Working Men's Pamphlet.*—Pamphlet No. 105 entitled "Working Men's Organizations in Local Anti-Tuberculosis Campaigns," has been completed and is ready for distribution at this meeting. This study aims definitely to stimulate the interest of anti-tuberculosis associations in organizing the working men and women of their communities. It is a practical pamphlet of suggestions on how to form such an organization, building upon the experience of various communities that have succeeded or failed in their efforts.

b. *Dispensary Study.*—Miss F. Elisabeth Crowell is completing for the National Association a thorough study of dispensary method and procedure, which will be ready for distribution by July 1. This pamphlet is designed to serve as a handbook on clinic technique for those who are now engaged in this form of anti-tuberculosis work or those who anticipate the establishment of tuberculosis clinics. Its object is to assist in the much needed standardization of methods, both medical and social, in tuberculosis clinic work.

c. *Hospital Food Study.*—The National Association has engaged Miss Laura A. Cauble, a special expert on dietetics, to make a careful study of sanatorium dietaries in a number of leading institutions of the United States. Miss Cauble's pamphlet, which it is hoped will be published in the early fall, will analyze carefully the food problem of tuberculosis sanatoria, from the point of view of the hygienic and dietetic content of the food, its purchase, its cost, its serving and the utilization of waste. This monograph will doubtless be one of a series of further publications to be issued later on sanatorium methods and procedure.

d. *Association Method and Procedure Study.*—As a companion study to the two preceding ones, a study of association method and procedure is under way. The very large amount of detail work incidental to this study has delayed it considerably, but it is hoped that it can be issued in the early fall or at least by January 1, 1917.

e. *Special Investigations.*—One of the functions of the National Association has been that of a bureau of advice and information on questionable organizations. With the development of the anti-tuberculosis campaign, it is not surprising that there have been a considerable number of pseudo-philanthropic ventures trading upon the public interest in tuberculosis. Such organizations as the Children's National Tuberculosis Society, The National White Cross League, The Mothers' and Children's National Aid Society, are just a few of the many organizations of this sort which the executive office is called upon to investigate more or less thoroughly. Some of these investigations have involved considerable time and expense, while some of them could be disposed of very easily. The question has often been raised as to how far the National Association should go in investigating not only organizations that are questionable, but so-called "cures" for tuberculosis and the various frauds of this nature being perpetrated upon the public. A large fund would be necessary for adequate work in this direction, and it is hoped that some day the National Association may be supplied with the means to perform this function.

f. *Sleeping-Out Pamphlet.*— A complete revision of the much used and very popular pamphlet entitled "Directions for Living and Sleeping in the Open Air," issued several years ago by the National Association, is in progress. The pamphlet will be entirely re-written with special new illustrations, and will be brought up-to-date in every respect. It is hoped that this work can be completed within the next month. In preparing the pamphlet, the Association is receiving the cooperation of the Metropolitan Life Insurance Company.

g. *Tuberculosis Directory.*— It is expected that the new Tuberculosis Directory will be ready for distribution within two weeks. The preparation of this volume has entailed an unusual amount of time and labor, owing to the very large increase in the number of agencies to be listed. Those who use the book will receive inspiration from a consideration of the magnitude of the campaign as indicated by its pages.

h. *Standard Pamphlet.*— Pamphlet No. 106 of the National Asso-

ciation, a standard educational pamphlet, prepared by a special committee of the National Association, has just been completed. Samples of the pamphlet are available for distribution at this meeting. The title of the pamphlet is "What You Should Know About Tuberculosis — Useful Facts for the Tuberculous and Those Living with Them." It has been prepared by a special committee of the Board of Directors. The pamphlet is designed for special distribution to those who have tuberculosis and who are sufficiently interested in the problem to read carefully the directions given by this publication. The American Medical Association is cooperating with the National Association in the publication of the pamphlet.

MOTION PICTURES

As a radical departure in the use of motion pictures, the National Association has during the past year instituted a special service of its own, whereby the various films dealing with tuberculosis will be made permanently available for those who wish to use them. The service was inaugurated in February, and has met with general favor. The films are rented at the nominal rental of fifty cents per day as contrasted with the usual lowest trade price of $2.00 per day. During the first ten weeks of service, the Association's twelve films were in almost constant use and some of them are now booked until October. The motion picture as an educational medium in the anti-tuberculosis campaign is proving more and more valuable, and with the rapidly changing character of the motion picture industry, this method of preserving for anti-tuberculosis workers films which would otherwise not be available, seems to be a highly desirable extension of the National Association's services.

During the last year three interesting new pictures dealing with tuberculosis have been put on the market, "The Lone Game," and "The Invisible Enemy," both produced in cooperation with the National Association, and the "Power of the Penny," a splendid four-reel picture dealing primarily with the work of the Wisconsin Anti-Tuberculosis Association and issued by that organization.

INSTITUTE FOR TUBERCULOSIS WORKERS

Another new departure in the work of the National Association has been the inauguration of an Institute for Tuberculosis Workers in conjunction with the New York School of Philanthropy. This Institute which will be held during the first three weeks of June aims to be a training school in methods of anti-tuberculosis work. It will be limited in membership to about twenty, and already that number has been enrolled. The group is a representative one, consisting of physicians, social workers, nurses and others. In conjunction with the Institute a special series of medical lectures for laymen will be given.

JOURNAL OF TUBERCULOSIS

During the past year a number of suggestions have been made with reference to the establishment of a Journal of Tuberculosis. After care-

ful consideration, the Board of Directors has decided that it would not be advisable at this time to establish such a Journal, but as an experiment in this direction a department of medical news, notes and abstracts has been inaugurated in the Monthly Bulletin. Beginning with the April number this department will contain four pages. It is hoped that the readers of the Bulletin will offer suggestions for improvement of this department. Only in this way can it be made of the greatest value. The question as to whether this department will eventually be expanded into a separate Journal of Tuberculosis is still under consideration.

OFFICE LIBRARY

During the past year, the Executive Office has made a special effort to improve its facilities for supplying information on various subjects relating to tuberculosis. The constant call for data on almost every phase of the anti-tuberculosis problem, particularly the social side, makes a move of this character imperative. The "Information File" installed more than a year ago is rapidly increasing in efficiency and now has listed reference and information on several hundred topics from a large number of volumes and pamphlets.

A file of the various International Congress Transactions has been added to the office library. This file is complete except for the transactions of one of the German Congresses which cannot be secured until after the war and of the Rome Congress which have never been published. An effort is being made also to complete the files of the transactions of the various national associations of countries in different parts of the world. A special library room will be available after May 15th. The office of the Association is always open for those who wish to do any research in tuberculosis.

MEMBERSHIP

For the first time in its history, the Association is able to report at its Annual Meeting a membership of over 2,500. On May 1st, the membership of the Association was 2,505. Our membership is in a healthy condition. Friends of the Association can do much to increase this membership and should cooperate in an effort to bring it to 3,000 during the next year. An invitation to your friends or acquaintances to become members will generally be accepted and appreciated.

THE INDIGENT MIGRATORY CONSUMPTIVE

It is not the purpose of this report to discuss the problem of the indigent migratory consumptive, but to indicate very briefly some steps which the Executive Office has undertaken or planned on behalf of the Association in relation to this problem. At the January meeting of the Executive Committee action was taken favoring a Division of Tuberculosis in the United States Public Health Service with an Advisory Commission of experts. No definite action was taken in relation to the question of Federal subsidies for non-resident indigent consumptives. With relation

to the proposition for a Federal Commission on Tuberculosis with an adequate appropriation, it was decided by the Executive Committee that this was not practicable and that the Division of Tuberculosis would be preferable. This action was ratified and sustained by the Board of Directors at its meeting in March.

In view of the considerable agitation in reference to the Kent Bill providing for Federal subsidies on which the Association had taken no positive stand, subsequent to the March meeting a letter was directed to 174 representative anti-tuberculosis associations, both State and local, in all parts of the United States asking their opinion on the desirability or undesirability of four different measures: (1) The Kent Bill; (2) A Division of Tuberculosis in the United States Public Health Service; (3) An Advisory Commission of this Division in the United States Public Health Service; and (4) An Independent Commission for Research and Investigation in the Problem of Tuberculosis. Answers from 54 different anti-tuberculosis associations and 1 individual representative of an association in 28 different States have been received. A tabulation of these answers shows that 34 are in favor of the Kent Bill; 14 are not in favor of this bill; 5 are undecided, and 2 made no answer. Forty-one (41) favored a Division of Tuberculosis in the United States Public Health Service, and only 1 voted against this plan, though 9 made no answer and 3 were undecided. Thirty-three (33) were in favor of an Advisory Commission to aid the United States Public Health Service in this investigation on tuberculosis; 4 were were not in favor of such a commission; 3 were undecided, and 14 made no answer. As an alternative to the first three propositions, the associations were asked if they favored an independent commission with an appropriation of at least $100,000 to deal with the tuberculosis problem. Thirteen (13) favored such a commission; 21 did not favor it; 4 were undecided, and 16 made no answer. It should be noted that these are not individual opinions, but they are the expressed votes of Boards of Directors of recognized anti-tuberculosis associations. As such, they represent the opinions of a large group of individuals. Summarizing these opinions, there seems to be a decided consensus of opinion in favor of the Kent Bill and also in favor of a Division of Tuberculosis in the United States Public Health Service, together with an Advisory Commission. There is a decided division of opinion as to the desirability of an independent commission; the majority of those voting being opposed to such a commission.

In addition to this compilation of opinions, the Executive Office has approached the problem of the indigent migratory consumptive from another angle in an endeavor to extend the educational campaign against the passing on of those who are sick and without means. In cooperation with the Transportation Committee of the National Conference of Charities and Corrections, a letter has been sent to practically all anti-tuberculosis associations in the United States, asking them to sign an agreement under which they bind themselves not to send any persons who have tuberculosis to a distant city or health resort unless they are assured

that the individual in question has adequate means to support both himself and his family and that he has a place to go to when he arrives at his destination. To date, May 8, we are informed by the Committee that 89 associations have signed this agreement. The object of this letter to anti-tuberculosis associations, however, is more than merely to secure their signature to an agreement of this character. It is to secure their active cooperation in inducing official and unofficial relief agencies, such as churches, lodges, department stores, factories, etc., in their several communities to sign a similar agreement. The National Association has suggested that as a further development of this campaign, an agreement of a modified character may be prepared for physicians. While a certain amount of Federal control may be desirable in relation to the problem of the indigent migratory consumptive, the problem will apparently never be solved until the people in the Eastern States, for example, have learned the danger and the folly of sending almost penniless consumptives to Denver, Los Angeles or some other distant health resort. The National Association hopes to contribute to this educational campaign.

The Executive Office has also arranged in cooperation with the chairman of the Sociological Section for a thorough discussion of the problem at this meeting of the Association and will endeavor to secure further publicity through the newspapers, medical press, and otherwise.

FINANCES

The Association closes its fiscal year April 30th with a surplus of $7,750, against which, however, there are a number of fixed charges, the bills for which have not yet been received. These charges will reduce the surplus to about $5,000. The increased revenue of the Association from the Red Cross Christmas Seals, together with the generous and continued cooperation and support of the Russell Sage Foundation, has provided the means for much of the Association's work during the past year. It is a pleasure to acknowledge the indebtedness we feel to the Russell Sage Foundation and the loyal cooperation and support received from the many Red Cross Seal agencies throughout the United States.

For the coming fiscal year, the Board of Directors has approved a budget of $44,280, an increase of approximately $7,000 over that of last year. Provided the support of every member of the Association is guaranteed to us and our other financial expectations are realized, we shall be able to meet this budget. It will provide for an additional secretary who will either serve as a general field secretary or as the head of a special hospital service bureau, or in both capacities. The Board of Directors has decided that the time has come when the Association should devote special effort to increase the efficiency of hospitals and sanatoria doing tuberculosis work throughout the country. It is hoped within the near future the Executive Office will be in position to render expert advice both as to the construction and the general administration and maintenance of tuberculosis hospitals and sanatoria and similar institutions. The

value of the service of the field secretaries, however, has proven so great that with the present limited budget it is doubtful if the full time of one or more members of the staff can be given exclusively to the hospital service, much as it is needed. The Association should have a much larger budget if it wishes to undertake all the things which should be done. It is hoped that all of the members of the Association will work towards this end.

SPECIAL COMMITTEES

During the past year a number of special committees have rendered valuable service to the Association, and some of them are still working upon the various problems entrusted to them. Brief mention of these several committees together with an insight as to the nature of their problems may be desirable.

1. *The Standard Pamphlet.*—The Committee on a Standard Pamphlet appointed more than a year ago has completed its labors. The standard pamphlet, to which reference has already been made, is ready for general distribution. The thanks of the Association are due to the painstaking efforts of this Committee and particularly to the careful attention which the chairman, Dr. Charles L. Minor, has given to the writing of the pamphlet. The other members of the committee are: Dr. David R. Lyman, Mr. William H. Baldwin, Dr. H. R. M. Landis, and Dr. John H. Lowman.

2. *Labor Committee.*— The Labor Committee of the National Association has been headed since its organization by the late Dr. Theodore B. Sachs. The other members of the committee are: Mr. Samuel Gompers, Mr. George W. Perkins, Mr. John Mitchell, Mr. Austin B. Garretson, Dr. William Charles White, and Dr. David R. Lyman. The study of Working Men's Organizations in Local Anti-Tuberculosis Campaigns has been made under the supervision of this committee. The committee has also supervised the publication of labor press notices. Dr. Sachs was particularly helpful in the personal attention he gave to this matter.

3. *Committee on Research.*— At the October 1915 meeting of the Board of Directors, a permanent Committee on Research was appointed. The committee consists of the following members: Dr. Edward R. Baldwin, Chairman; Dr. Theobald Smith, Dr. William H. Park, Dr. H. Gideon Wells, Dr. Paul A. Lewis, and Dr. Eugene L. Opie. Since the chairman, Dr. Baldwin, will make a report of the work of this committee before the Pathological Section, a further statement here is unnecessary except to say that the committee has already investigated facilities and plans for the conduct of a number of important experiments. The activities of this committee during the coming year should greatly stimulate research in tuberculosis.

4. *Committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children.*— The Committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children was appointed at the October 1915 meeting of

the Board, to take up and to consider in detail certain standards originally prepared by the New York Association of Tuberculosis Clinics and suggested to the Board of Directors of the National Association as desirable for adoption and general use throughout the country. These standards will be discussed at a general session of the Association to-morrow afternoon at 5:00 o'clock. The members of the committee are as follows: Dr. James A. Miller, Chairman; Dr. Bertram H. Waters, Dr. John Howland, Dr. Henry I. Bowditch, Dr. I. A. Abst, Dr. John H. Lowman, Dr. O. W. McMichael and Dr. G. L. Bellis.

5. *Committee on Medical Education of Physicians.*— Realizing the necessity for increased interest on the part of physicians in tuberculosis, the Board of Directors at its October 1915 meeting authorized the appointment of a special Committee on the Medical Education of Physicians. Dr. H. R. M. Landis is chairman of the committee and the other members are as follows: Dr. Gilman Thompson, Dr. George Blumer, Dr. John Ritter, Dr. Charles P. Emerson, and Dr. George H. Evans. The committee has arranged for a special discussion of the subject of medical education before the Clinical Section of this meeting, and has also arranged to present the claims of tuberculosis for special consideration to the faculties of the leading medical schools of the country.

6. *Committee on the Education of Nurses.*— As a companion committee to the one on medical education, the Board also authorized the appointment of a Committee on the Education of Nurses, whose function will be similar to that of Dr. Landis' Committee. The chairman of this committee is Miss Ella Phillips Crandall and the other members are: Miss A. W. Goodrich, Miss Carolyn Van Blarcom, Miss Mary Beard, Mrs. Bess Davies, Miss Edna Foley, Miss Chloe Jackson, Miss Rosalind Mackay, Miss Virginia Martin, Miss A. K. Sutton, Miss Alice Stewart, and Miss Helene Stewart.

7. *Committee on Handbook for Medical Practitioners.*— As another step in the Association's effort to increase the interest of the medical profession in tuberculosis, a special committee was appointed a year ago to prepare or secure a handbook for medical practitioners dealing with tuberculosis. This committee, under the leadership of Dr. James Alexander Miller, has studied the available literature on tuberculosis and reported at the last meeting to the Board of Directors that none of the books now on the market appear to be what is needed for this purpose. By authority of the Board, Dr. Miller has been requested to prepare such a handbook for medical practitioners with the assistance of the other members of his committee. The members are: Dr. Louis V. Hamman, Dr. John B. Hawes, Dr. Lawrason Brown, and Dr. William Charles White.

8. *Committee on Health Insurance.*— At the meeting of the Board of Directors in March, 1916, the subject of health insurance was discussed and a special committee was appointed to advise the Association as to what its attitude should be in relation to this problem. The general consensus of opinion of the board was in favor of health insurance, but

there seems to be some difference of opinion as to the desirability of certain specific laws that have been before State legislatures during the past year. The committee in question consists of Mr. John M. Glenn, Chairman; Dr. Hermann M. Biggs and Dr. Lee K. Frankel.

9. *Committee on Interstate Traffic in Dairy Products.*— Because of a considerable amount of agitation in various parts of the country with reference to further Federal control of interstate traffic in dairy products which may be infected with tubercle bacilli, at the March meeting of the Board of Directors, a special committee was appointed to look into this subject and to report on the desirability of action by the National Association. This special committee consists of Dr. Hermann M. Biggs, Chairman; Dr. Theobald Smith, Dr. M. P. Ravenel, Dr. E. C. Schroeder, and Dr. W. A. Evans.

NEW DIRECTORS ELECTED

Because of deaths and resignations, the Board of Directors at its March meeting found it desirable to fill several vacancies in the Board. In accordance with the provision of its By-Laws providing for the election of directors to fill unexpired terms, the Board at its March meeting elected the following individuals: Dr. Dunning S. Wilson, of Louisville, Ky., to fill the unexpired term of Dr. Hatfield ending in 1917; Dr. John H. Lowman, Cleveland, Ohio, to fill the unexpired term of Dr. E. L. Trudeau, ending in 1917; and Mrs. O. B. Colquitt, Dallas, Tex., to fill the unexpired term of Bishop Frank S. Spalding ending in 1918.

EXPERIMENT IN COMMUNITY CONTROL

As Dr. Baldwin has already announced, the Metropolitan Life Insurance Company has placed at the disposal of the National Association a fund of $100,000 for an experiment in community control of tuberculosis. The Executive Office has cooperated with Dr. Lee K. Frankel, Sixth Vice-President of the Metropolitan Life Insurance Company, in his preliminary study of the subject before bringing it before the Board of Directors of his company. It may not be out of place here to express appreciation for Dr. Frankel's personal interest in this matter and to extend thanks to him individually for what he has done to make possible the realization of an ideal in the control of tuberculosis.

CONCLUSION

In conclusion I wish to express my personal appreciation of the great services of Dr. Theodore B. Sachs, whose tragic death we so deeply deplore. His intense devotion, fertile suggestions, and wide grasp of the whole problem have done much to stimulate the Executive Office and the Board of Directors to adopt new methods and to develop in new directions.

I wish also to extend my thanks and appreciation to the members of the Board of Directors who have so loyally stood by the Association during the past year; and to the Staff of the Executive Office for their continued

and constant unselfish service on behalf of the Association. I wish also to express my personal appreciation of the services of the Assistant Secretary, Mr. Jacobs, upon whom the burden of the work of the office is placed and to whose ability and loyalty the success of the work is largely due.

Respectfully submitted,

CHARLES J. HATFIELD,
Executive Secretary.

REPORT OF THE COMMITTEE ON STANDARDS OF DIAGNOSIS OF PULMONARY TUBERCULOSIS IN CHILDREN

EDITORIAL NOTE

At the meeting of the Board of Directors of The National Association for the Study and Prevention of Tuberculosis on October 16, 1915, a report of a committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children from the New York Association of Tuberculosis Clinics was submitted with the suggestion that it be adopted by the National Association as a uniform method of diagnosis throughout the United States. The Board of Directors of the National Association appointed a committee to consider the standards submitted and to report back to the board upon their adoption. This committee, consisting of Dr. James Alexander Miller, New York, chairman; Dr. B. H. Waters, New York, secretary; Dr. John H. Lowman, Cleveland; Dr. Henry I. Bowditch, Boston; Dr. John Howland, Baltimore; Dr. I. Abst, Chicago; Dr. O. W. McMichael, Chicago; and Dr. G. L. Bellis, Milwaukee, submitted the report given below at the meeting of the board on March 11, 1915. It was then decided to have the report printed and distributed to members of the Association and presented for discussion at the annual meeting of the Association.

To the Directors of The National Association for the Study and Prevention of Tuberculosis

Gentlemen:

At your meeting on October 16, 1915, this Committee was appointed to consider the approval and adoption of certain standards for the diagnosis of tuberculosis in children, which were set up by a committee, appointed for this purpose, of the Association of Tuberculosis Clinics of New York City.

A copy of these proposed standards was sent to each member of the Committee and from each replies have been received which approve of their essential requirements.

They have been so amended, in form and substance, as to conform with the criticisms and suggestions offered.

Your Committee therefore recommends the adoption of the standards, as follows:

STANDARDS FOR THE DIAGNOSIS OF TUBERCULOSIS IN CHILDREN

I. Necessary Inquiries and Determinations for the Diagnosis of Tuberculosis

History

Exposure (especially if prolonged)
Delayed convalescence from illness
Malnutrition
Underweight for height or loss of weight
Cough
Expectoration
Hemorrhage
Pain
Pleurisy
Dyspnœa
Night sweats
Digestive disturbances
Ear discharge

Constitutional Symptoms

Malnutrition
Underweight for height
Elevation of temperature, acceleration of pulse, rapid respiration
Cough
Expectoration
Hemorrhage
Pain
Pleurisy
Dyspnœa
Night sweats
Digestive disturbances

Physical Signs

Persistent and persistently localized râles
Additional abnormal signs elicited by the usual methods of examination
Any glandular, joint bone, muscular, cutaneous, ocular, or aural abnormalities

II. Essentials for the Diagnosis of Pulmonary Tuberculosis

1. Distinct persistent and persistently localized adventitious signs (râles) in the chest.

Location: a. About the nipples — that is, anywhere between the fourth and sixth ribs, the border of the sternum and the anterior axillary line.

b. Anywhere along the border of the sternum, or in the region of the apices, as in adults. These, however, are infrequently found.

These râles may be heard during inspiration or expiration, or after a cough. In many instances they can be elicited only by the cough.

c. Râles limited to a considerable part or the whole of any one lobe. If these are associated with a positive tuberculin test and persist over a considerable period of time, they should be regarded as tuberculous, despite the fact that in association with enlarged tonsils or adenoids similar signs may occur. However, in the absence of any means of definitely interpreting these signs, and particularly with a history presenting evidence of exposure to tuberculosis, it is wise to give children the benefit of the doubt, and to consider them tuberculous.

2. Temperature over 99 by mouth, constant, recorded twice weekly for one month, and not otherwise explained.

3. A positive tuberculin test.

Exceptions: In the absence of adventitious signs a diagnosis of tuberculosis may be made in the following instances:

(1) Given a positive tuberculin reaction, with an unquestioned and otherwise unexplained hemoptysis and with or without a definitely positive radiograph, the diagnosis of pulmonary tuberculosis is to be made.

(2) Given a positive tuberculin reaction in children under three or four years of age, even without constitutional symptoms, and in older children with frequent cough or rapid pulse or fever, in addition to a radiograph which shows unmistakable mottling well into the pulmonic fields without any sharp outline suggestive of calcification, a diagnosis of pulmonary tuberculosis is to be made.

Notes: (1) Cough will be present in most instances, but its absence does not negative a diagnosis of tuberculosis when the essentials above mentioned are present.

(2) A Wassermann test should be made for all patients having a suspicious history or symptoms.

(3) No patient with fever and persistent physical signs should be considered free from tuberculosis until the tuberculin test has given a negative reaction three successive times. In the interval patients are to be considered as " under observation."

(4) Examiners are reminded that undue importance should not be ascribed to the slight vocal intensification and respiratory modifications, or to slight alterations in the percussion note, so frequently present in children, especially at the apices, unless they are persistent.

III. Essentials for the Diagnosis of Other Forms of Tuberculosis

To determine the presence of tuberculosis there must exist: suggestive physical signs or constitutional symptoms or both (see I, page 38), negative Wassermann and positive tuberculin reactions.

Note: (1) Some conditions of glandular enlargement, even with positive tuberculin and negative Wassermann reactions, will require the elimination, by further clinical examinations, of lymph-adenoma, adeno-sarcoma, or other adenopathies.

IV. Suspects

To determine suspects physical signs may be absent or indefinite, but there must exist one or more suggestive constitutional symptoms or items of the history (see I, page 38), and a negative Wassermann reaction.

James Alexander Miller, *Chairman.*
Bertram H. Waters, *Secretary.*

Dr. B. H. Waters, New York: I will report very briefly, as Secretary of the Committee. The Committee wishes to have the fullest and freest discussion and I wish to leave all the time possible for it.

I think we will all agree that the diagnosis of tuberculosis in children is one of our most difficult problems. Those of us who have had very much to do with a number of Clinics, or have studied the records of a large number of children examined by a number of different examiners, must feel that the diagnoses were based, in many instances, upon insufficient data and standards that were not uniform. So we in New York, in the Association of Tuberculosis Clinics comprising 28 Clinics, felt that we would like to make a step toward some definite criteria, the least possible number of which would be essential for a diagnosis.

A Committee of the Association was appointed to consider this subject and they set up these standards. It was then our desire, before adopting them for our own use, to have them presented and adopted, perhaps in a modified form, by the National Association, and that is the purpose of this meeting to-day, the Directors of the Association having referred the report of their Committee to this general meeting.

As you will see in glancing at the standards, we laid down first, certain points of history, certain constitutional symptoms, and certain physical signs or conditions which we felt every examiner should have in mind in his preliminary study of a child.

Then come "Essentials for the Diagnosis of Pulmonary Tuberculosis," and let me say that by "essentials" we do not mean pathognomic conditions, but conditions which we felt were essential as a basis for diagnosis.

The first, "distinct persistent and persistently localized adventitious signs," requires little comment. In a and b, the usual site of tuberculous râles and the necessity of testing their persistency or of demonstrating their presence by coughing, is noted. In c, attention is directed to the frequency with which obstructed respiration, mouth breathing, resulting in a general congestion of the respiratory mucous membrane produces such signs, though tuberculous lesions may be absent.

The second, "temperature," was one of the much discussed points. We felt that it ought to be placed in the Standards as at least one of the evidences of activity of a tuberculous lesion. Given sufficient time and opportunity, an examiner will make more frequent, perhaps twice daily, temperature observations. Two a week, for a month, seemed to be a minimum requirement in order to determine its presence and persistence.

The third, "a tuberculin test," in a great many instances has a very positive value and should be included.

To these three essential conditions, there are certain exceptions, which I should expect to have criticized in the discussion. By these exceptions, we have endeavored to justify the diagnosis in those uncommon cases without physical signs and perhaps lacking constitutional symptoms also, which have had hæmoptysis, or show a suggestive radiograph, and react to tuberculin.

The next classification "3," applies to other than pulmonary forms of tuberculosis; and finally, there is a fourth, under which children who might be considered suspects, are considered.

As you have this report before you, and as the discussion goes on, I

think points will occur to you upon which you will wish to ask questions or which you will wish to criticize.

Dr. H. S. Wagner, Hartford, Conn.: When the Bulletin of the National Association brought me the report of the committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children, I was delighted. I immediately tried it out in the classification of 125 children at the Hartford State Tuberculosis Sanatorium, Hartford, Connecticut. The result was as follows:

II. Essentials to a diagnosis:

1. Persistent râles
2. Temperature over 99 degrees one month
3. A positive tuberculin test

} 16 { Girls 14 / Boys 2

Exceptions:

1. With an unquestioned or otherwise unexplained hæmorrhage 1
2. Positive to tuberculin test:
   (a) Under 4 years 11
   (b) Older with .. { cough / pulse / temperature / x-ray } 8

Notes (3) other diagnoses with temperature and signs ..... 9 { 2 Congenital Syphilis / 3 Heart Lesions / 1 Bronchitis / 2 Marasmus / 1 Streptothricosis

III. Bone and gland forms 11

IV. Suspects: 39.

20. Sensitive to O. T. { Females ..... 8 / Boys ..... 12 / Family history positive. 9 / Wassermann positive .. 7 }

19. Sluggish to O. T. { Females ..... 8 / Boys ..... 11 / Family history positive. 8 / Wassermann positive .. 6 }

} 39

V. Non-tuberculous 30

With the preceding classification I can offer a few explanations:

In the first group of sixteen the diagnosis is fairly easily made according to the three essentials. A radiograph in five cases showed the mottlings or densities of tuberculosis. There was no doubt about it. The diagnosis was as clean cut by this means as by the stethoscope. In all but the three youngest, the site of disease resembled the adult type and

was located in the apices. The youngest is 5½ years, six are 9 to 10 years, 9 are 11 to 13 years old. The rapid spread of disease since the patient first began to complain is a striking feature here. In fourteen, all girls, the course seems to have been subacute and interrupted. In the two boys it is noticeably more chronic.

Under the subdivisions: Exception (1), I have placed one case, self-explanatory and under, Exceptions (2) nineteen cases. Eleven of these were under three years and showed the necessary positive tuberculin reaction for a diagnosis. Eight were older, four to twelve years, and presented slight constitutional signs or a radiograph suggestive of disease extending into parenchyma of the lung. Seven of these nineteen cases showed a progressive type of disease and are dead.

Under the subdivision, Notes (3), nine cases with temperature and persistent signs were ruled out by negative tuberculin tests or the course of the disease and guinea-pig tests.

The eleven cases under the main heading, III, were all purely tuberculous except one, an eight year old girl, giving a four plus Wassermann test, whose father gave a two plus. Pus from sinus just below her knee produced tuberculosis in a guinea pig, hence we concluded it was one of those combinations that recently are becoming more frequently reported.

As regards the suspects, their number is 39. The youngest is six years old. Seventeen gave a positive family history. Several gave indefinite chest signs or a suggestive constitutional symptom. Twenty-three were radiographed. The results were either negative or diagnosed as calcified glands or infiltration in one or both hila. Nothing indicating a fresh invasion of disease was seen.

The one feature of this class common to all is a positive tuberculin test. In 28 of these cases the routine Von Pirquet was followed by subcutaneous injections of O.T., beginning with $\frac{1}{10}$ mgm. and passing through doses of ½, 1, 2 and 4 mgm. unless a distinct reaction contraindicated further tests. On the degree of the reaction, it would appear that there were two types of latency of disease, a sensitive type and a sluggish type. The latter would give a faint Von Pirquet, $\frac{1}{10}$ mgm. O. T. would produce no reaction locally or constitutionally; one-half mgm. would raise temperature to 99.6 degrees and produce redness and tenderness at site of injection. One and two mgms. would do no more than the smaller doses. Nine were of this type.

The remainder or nineteen were more sensitive to a Von Pirquet and a small dose like $\frac{1}{10}$ mgm. A definite malaise would ensue, together with a more intense redness, tenderness and induration at site of injection.

According to the schema, the positive Wassermanns should have been removed to non-tuberculous class. I have not done this because so many seem to show a sluggish type of reaction to tuberculin. In two other cases I have had pronounced combinations of congenital syphilis and tuberculosis and why not here?

Finally, there were 30 cases pronounced non-tuberculous. None showed

a suggestive sign or symptom except a positive D'Espine's sign in eight cases which were negatived by an x-ray plate or a tuberculin test. The average temperature of this class seems to average about .4 degrees lower in the morning than among the suspects. The daily temperature curve is regular, with the morning and evening points near together, not separated by more than .6–.8 degrees. Of course, when dealing with these small differences in the individual case one can not lay much on them towards diagnosis. Some children's temperature centers are quite irritable or sensitive. Keeping the child quiet and excluding outside excitement ought to be tried at first to make the temperature chart more regular and level. Later, small injections of O. T. should follow to ascertain sensitiveness to tuberculin. On one point I would like your assistance very much — on the question, how long suspects should be suspected; what time limit should be set to determine whether a 99.4 degree temperature — a malaise or an indefinite rale is due to tuberculosis? This is an important question in a State institution.

Dr. Myer Solis-Cohen. Philadelphia: There is one mistake we are likely to make if we base all our reports on children in sanatoria, tuberculosis clinics and tuberculosis hospitals. There are a great many latent cases and a great many healed cases that have no signs referable to the lungs, who would be ruled out by this classification; they would not even be included among the suspects. Therefore, under history, I would suggest another classification, " chronic ill health without actual disease " and under constitutional symptoms, " nervous irritability, lack of nervous control." Often children who present these signs of nervousness have latent tuberculosis.

In addition to " Underweight for height," I would suggest " failure to gain in weight." Often in a latent case, despite all that one does, the child fails to gain in weight.

I suppose under " Malnutrition " would be considered children who are under physical tone.

Low blood pressure is not mentioned among the constitutional symptoms. That is rather constant in tuberculosis. One of the psychic phenomena which I have noted (I do not know whether it is common enough to be included), is bad behavior due to the irritability. Of course you could not include that, but there is a child who is listless and dull when he goes to the sanatorium and whose whole psychic attitude changes later when he is getting better. The child becomes obedient and is interested and brightens up mentally and is able to progress better in his studies.

In addition to digestive disturbances I should think anorexia and impaired appetite might be added to the constitutional symptoms.

Among the physical signs there are a number of things, which may or may not be important. Enlarged thyroid gland is often present in children with latent tuberculosis and with early tuberculosis. Dermographia is present in a great many cases of tuberculosis. Under " Constitutional Symptoms," it mentions night sweats, but there is often in addition vasomotor sweating in children to which I think attention should be paid.

Among "the essentials for the diagnosis of pulmonary tuberculosis," they include "distinct persistent and persistently localized adventitious signs (râles) in the chest." I would like to ask the committee if that means that a child must have râles before a diagnosis of tuberculosis can be made; because latent cases and mild cases often exist with nothing but a little dulness, sometimes no râles and often no change in the breath sounds. Then they mention temperature. A great many of these latent cases or mild cases do not have fever; they do not have a temperature over 99 degrees. Consequently they would be ruled out according to this classification.

I would like to ask in speaking of a positive tuberculin test, that they state definitely what kind of tuberculin is used; whether it is old tuberculin or some other form; what method of testing is used — whether the Von Pirquet or the intradermal or subcutaneous; what the dose should be. Ordinarily I think a milligram is used or a $\frac{1}{10}$ of a milligram possibly, with children. Inasmuch as a great many react with such large doses, possibly a more minute dose should be regarded as the dose for diagnosis, perhaps $\frac{1}{1000}$ of a mg. or a $\frac{1}{100}$ of a mg.

Dr. Philip King Brown, San Francisco: I realize it is much easier to criticize than construct. I think this classification is a very commendable one. I think the question of "exposure" under "History," the first one, is more a question of anemia than prolonged exposure. The question of failure to gain, in addition to being under weight was already mentioned.

Under temperature, it seems a variation in temperature is a little bit more important than the question of febrile condition. In children the mouth temperature is of very little importance and of very little value, and it would seem that the tuberculin test should be standardized by the Committee. I think at the present time there are several different methods in vogue.

On page 39, number three, in the first paragraph it says, "No patient with fever and persistent physical signs should be considered free from tuberculosis until the tuberculin test has given a negative reaction three successive times." That should be changed, because it is well known that frequently the test is negative, whereas, with a return to normal temperature, the test becomes positive.

Under "Essentials for the diagnosis of other forms of tuberculosis" it seems that this classification rather leads one to believe that pulmonary tuberculosis in children is an incipient stage condition. I think, perhaps, if the classification were made as being peribronchial or thoracic tuberculosis or mediastinal tuberculosis, and as a sequence to that second group, pulmonary tuberculosis, that we would have a classification very valuable from the view of prognosis and also showing the sequence of the progress of the disease. I think that with this classification, a great many children would be considered non-patients, whereas, as a matter of fact, they would be very definite patients of tuberculosis, and those patients should receive the same amount of care as a child who has real signs in the lungs.

It would seem that this classification is very much the same as the classification of tuberculosis in adults, which we have.

Dr. C. M. Montgomery, Philadelphia: The Committee on Standards of Diagnosis of Pulmonary Tuberculosis in Children deserves all credit for the way in which they have attacked this difficult problem. At the same time I question just how much any new scheme of this kind can simplify the diagnosis of tuberculosis in children. I take it that the cases specially in mind are those of chronic pulmonary tuberculosis in childhood, and not those suffering from the various acute types of tuberculosis. Chronic pulmonary tuberculosis when it does occur in childhood is to be diagnosed very much on the same lines as chronic pulmonary tuberculosis in adults, that is, on the history and symptoms, or on the physical examination, or on both. If the case, though manifestly ill, yields no certain diagnosis after a searching investigation as to tuberculosis and other etiological factors responsible for chronic bad health, the best one can do is to recognize and admit his ignorance, and give the patient advice directed towards the general upbuilding of his health, meanwhile keeping the patient under strict observation. Experience and thoroughness will help to limit the number of doubtful cases. How much is added by a scheme like that under discussion, is a matter for debate.

Dr. J. H. Elliott, Toronto: Those of us who are working in the Children's Clinic, when we received this schema, got together to criticize it in a helpful way, and we were glad to find that such a schema was possible, and I think the committee ought to be congratulated on what they have done.

We would like to see a little more emphasis placed upon percussion. In paragraph 2 they speak of apical disease of the type seen in adults as being infrequently found. After rather prolonged experience in children's clinics we find that the adult type is not at all infrequent, and I would suggest that the committee pay some attention to the question of percussion.

Under "History" I would suggest that the word "prolonged" be eliminated, substituting the word "intimate." We also feel that "underweight for height or loss of weight" should also include "for height or age." Night sweats are important, but if the child also sweats easily on exertion, or sweats when sleeping in the day time, this should also be considered.

"Ear discharge." Of course, that would particularly be chronic ear discharge. One item which has been omitted is the frequent occurrence in children of a history of phlyctenular conjunctivitis. It has been our experience that every child that has had phlyctenular conjunctivitis has given a tuberculin reaction.

Under "Constitutional Symptoms" I would suggest the addition of something which would comprise that loss of desire to play, which is present in many children, or where the mother will tell you that the child comes in from play rather tired and wishes to lie down.

In our own circle we rather object to the constant use of cough to induce

râles being elicited by cough. It is particularly important not to induce excessive cough in advanced cases as the cough is rather harmful and the same result can be secured by asking a person to take a full or extra expiration. The object, of course, is to empty the lungs completely, and if one will take a full or deep breath, followed by forcible expiration, one can get the same result, and not produce the same amount of disturbance in the lung.

At the end of paragraph C the report says under such conditions "It is wise to give children the benefit of the doubt and to consider them tuberculous." I do not think we are justified in calling any child or any person tuberculous unless we have a fairly definite cause for doing so. That is to say a provisional diagnosis of tuberculosis is to be made, and the child kept under observation, but it goes against a child in after life to have a definite diagnosis made, and it is going to be increasingly so where the results of our clinics are copied into public health records and are on file in the Public Health Department, and all through the child's life this record will be against him. I would make the suggestion that "a provisional diagnosis be made and the child kept under observation."

As to the temperature limit as defined in the report, this may be all right where a child is observed at home or in hospital or sanatorium, but where a child is in a waiting room in a large clinic for one or two hours, we find that they frequently develop a temperature of 99½ or 100, and we must be very careful about ascribing this to disease. The normal temperature in a child is not as fixed as in the adult, and fluctuates readily. In the latter part of the paragraph it says —"Not otherwise explained," but we know the temperature in children is not very stable.

I would like to make a plea against the use of the term "positive tuberculin reaction" where our records are being used by the Public Health Department. That word "positive" often conveys to the laity a meaning of positive diagnosis of tuberculosis. We do not wish to infer that because the tuberculin reaction is present there is a positive diagnosis of tuberculosis to be made. It would be wiser and safer to say that the child reacts or does not react to tuberculin and get away from the words "positive" or "negative."

One other point has been brought out in discussion and is important, and that is that the tuberculin reaction may be absent again and again in the presence of fever, and I do not think we should consider a child definitely non-tuberculous who does not react to tuberculin unless the test has been carried out in the absence of fever.

Dr. J. H. Holbrook, Hamilton, Ont.: I just want to refer to one or two points, especially in connection with the question of percussion, which I do not think is sufficiently emphasized in this report. I think the paper read in the clinical section just a few minutes ago explains some of these points in connection with children. We believe that tuberculosis is common in the lungs of children, but that the primary infection is usually in the bronchial glands, and Dr. Lapham suggests that pressure of the bronchial glands may produce a certain amount of collapse of the air

cells or œdema at the apices and other parts of the lungs. To demonstrate this slight change over the apices, the ordinary percussion, beginning at the apices and proceeding downward with heavy percussion is of no use in the diagnosis in children. The one thing in my experience that counts most is very light percussion, starting about midway of the chest and proceeding upwards, and for this you must have a quiet room. The diagnosis of early tuberculosis in a child would be impossible in this room because of the noise outside, and in some dispensaries there is too much noise. My contention is that in percussion of the chests of children you should use very light percussion, with just sufficient force that on coming to the area of the lung which has slightly impaired resonance, the sound will disappear rather than change in the character of the note.

This method is of value too, in marking out the heart and I think that it is the most constant and most valuable sign of early pulmonary involvement in children.

Then where there is active trouble, you will always find associated a change in the auscultation. There will be a slight prolongation of the second sound and a little higher pitch to the note, and the more acute the condition or the more congestion there is in the apices of the lung, the more broncho-vesicular the note will become. With active trouble there will also be found the slight daily rise of temperature characteristic of tuberculosis and I think these are the three important signs that should be depended upon in the diagnosis of early pulmonary tuberculosis in children.

The points covered in the report seem to me simply to confirm the diagnosis. For this purpose I think they are good throughout, though not always essential. In a report to guide men in the diagnosis of early tuberculosis in children I would like to see more stress laid on light percussion in an absolutely quiet room and a very slight change in the auscultation note associated with temperature. These are the signs that are within the reach of every medical examiner and are still of most value.

Dr. Linsly R. Williams, New York: Some three or four years ago Dr. Brenner and I formulated some rules for making diagnosis of children where the diagnosis was not entirely evident and we adopted some such scheme, a little similar to this, and after we had printed our first report of the work, it was seriously criticized because of the standards used in making the diagnosis of tuberculosis in children. The most serious criticism that was made against the report was the fact that if a child had evident tuberculosis with positive physical signs and tubercle bacilli in the sputum in accordance with careful reading of the report that was not a case of pulmonary tuberculosis, and as some of my friends on the Committee here were those who criticized our report, I would like to suggest that before the report now before us is made permanent and published for general distribution that they do not fall into that same pitfall that we did, and that they put in front of their "Standards of Diagnosis of Pulmonary Tuberculosis in Children," that the same standards of diagnosis of tuberculosis in children obtain as they do in adults, and that the

physical signs of tuberculosis with the presence of tubercle bacilli in the sputum are probably pretty fair indications of the presence of tuberculosis in the lungs, and rather than leave that out entirely, it seems to me that it might be advantageous to put in a preamble or some inkling showing that that was in the mind of the committee.

In other words, what I have in mind is that the schema of diagnosis of tuberculosis in children is differently made and should be so arranged that we would all know what we were talking about when we spoke of the child as having pulmonary tuberculosis in the absence of tubercle bacilli and the absence of definite signs, and it seems to me if that had been stated in the report, possibly some of the gentlemen who are interested in physical signs, auscultation and percussion, might not have felt that was quite such an important point.

There is one thing I would like to mention, and that is under the subject of "Constitutional Symptoms." Under heading 4, "Suspects. To determine suspects physical signs may be absent or indefinite, but there must exist one or more constitutional symptoms." Now, if that is interpreted as it is written, it means that any child that coughs is a tuberculosis suspect; that any child with a digestive disturbance, in a mild or large degree, is a suspect, and it would practically mean by literal interpretation of what the report says that nearly every child at some time or other in its life is a suspect of pulmonary tuberculosis, and I do not believe that the committee meant to convey that impression. To be sure they said, "One or more suggestive constitutional symptoms," but it would seem to me that they ought to be grouped in some way that would relieve the suspicion of tuberculosis from one child that has only one of those symptoms.

Dr. Alfred Meyer, New York: I think the committee on the whole have tackled this very difficult problem in a very excellent way, and I hesitated when I examined the report whether to say something about it or not. I am encouraged to get up anyway and will make a few remarks, because first of all I have written down some criticisms I found when I looked the report through; and, second, because I was met in the doorway by one of our officers and was told that they were hoping to have a spirited discussion. I do not know whether I will quite measure up to that standard.

First of all with reference to the wording of the whole heading, I think it would be preferable to call it the "Report for Standards of Diagnosis of Tuberculosis in Children." I do not know whether that on the whole might not have been wiser, although I frankly admit that the Committee was appointed to make a standard for *pulmonary* tuberculosis, and, of course, they had to use the words which were assigned to them, but I think on the whole the conclusion of their work might be more valuable if the final report read "A Standard for the Diagnosis of Tuberculosis in Children," as that would include all the types referred to incidentally in the report.

Second: the question of what standard of age the committee have decided upon to be called children. I have marked here tentatively, "prob-

ably up to 15 years of age," though I admit that is not absolutely a correct standard either. I thought it might be wise for the purpose of suggestion to put in "those to be regarded as children, who are 15 years or under, unless they are apparently older." That is the classification used in one of the large hospitals in New York; the rule forbids the admission of children under 15 years of age, to the adult wards, unless they are apparently older. In other words, children that seem to be sexually well developed in various ways, are not classified as children.

Then under physical signs, I think sometimes the *negative* evidence is extremely valuable, and though I hesitate to extend the length of detail I do think that in view of the frequency of mistakes in suspected tuberculosis in children, as well as in adults with mitral stenosis that it might be wise to put into the physical signs "absence of mitral lesions."

Then if you look in column 2 under "Temperature over 99 by the mouth," it says "recorded twice weekly for one month." I was in doubt what the committee meant; perhaps others were also. Did they mean twice a week, eight times a month, or did they mean t. i. d. on two days a week, that is six times a week or 24 times a month?

It seems to me that taking the temperature twice a week, under the first interpretation say once on Wednesday, and once on Friday, or Saturday, might prevent our recognizing an elevation of temperature, perhaps observable under the second interpretation.

Then under exceptions in paragraph 1, I think Dr. Solis-Cohen's suggestion to be more definite as to what is meant by positive tuberculin reaction, is well taken, whether, for instance the ophthalmic reaction, or a general reaction after hypodermic injection, or a Von Pirquet is meant.

Then under paragraph 2 of Exceptions, "given a positive tuberculin reaction," I think the committee ought to be more definite as to what they mean.

At the end of the same paragraph I hesitate very strongly to accept at its face value the statement—"Given a positive tuberculin reaction in children under three or four years of age, even without constitutional symptoms, and in older children with frequent cough or rapid pulse or fever, in addition to a radiograph which shows unmistakable mottling well into the pulmonic fields without any sharp outline suggestive of calcification, a diagnosis of pulmonary tuberculosis is to be made." I want to draw attention to the fact that as it appears to me when there is evidence of calcification there is additional suspicion of tuberculosis and if the question of diagnosis comes up and the child has some of these other details, I would be inclined to say, that calcification of the hilus glands is corroborative of tuberculosis.

In other words, under such circumstances my conclusion would be the opposite of the one reached by the committee.

Referring to note 3, I really think that the word "suspect" would be better than "under observation." Reading the last part of paragraph 3 it says, "In the interval patients are to be considered as under observation." Yes, and a little more than that. They would not be kept under

observation if they were not suspects, and it explains to parents and children what we mean by it. And finally I might insist that in coming years the use of the complement fixation test for the recognition of doubtful cases should be used much more frequently than in the past. It is a very valuable test both in the positive and in the negative sense, and it can be made when the Wassermann test is made.

Dr. John H. Lowman, Cleveland: I wish to say a word or two in support of the work of the committee which has prepared these standards. There were very many difficulties which were encountered by the committee in coming to a unanimous decision. Dr. Elliott, I think, was quite right in insisting that Kerato-conjunctivitis should be included in the probable symptoms of tuberculosis in children. Regarding the question of fever, this is a point where the committee encountered particular difficulty in coming to a satisfactory conclusion. On the whole, however, I feel that the report should be well supported and that with some minor changes it would be acceptable to the Association.

Dr. O. W. McMichael, Chicago: I think the committee considered most of the criticisms that have been offered here. All of us can think of many points on which we might criticize the report. The object of the committee in formulating this standard has been to gather together the largest number of points upon which the largest number of men can agree.

I believe we have here a standard of diagnosis that will meet the objections and secure the approval of the largest number of men.

Dr. Waters: I am sure if all of the members of the Committee could have been here, they would be very much pleased with the general attitude of agreement and favorable comment on these standards. I know I can speak for the Committee when I say that they approached this task with a thorough realization of its difficulties.

I would like to say in response to my friend, Dr. Williams' comment, it is true that we do not say exactly what we mean here. While we do not say so, we did mean to establish *minimum* standards. For that reason, I think some of the criticisms which have been made are not to the point. We assume that any examiner will perform percussion in the way in which it will give him the most information; and we could not define methods or include in Standards such as these, all possible conditions, such as dermographia. It was our intention to place before the members of this Association, certain conditions and the *least* number of conditions upon which one would be justified in making a definite diagnosis of tuberculosis, either pulmonary or other forms.

The criticisms which have been made, I am sure, will be very helpful to the Committee when they begin to revise their work; but I regret to say that none of the speakers has given us very much help on this matter of temperature. That was, perhaps, one of the most discussed points. We felt that it could not be omitted, but it was difficult to set any figure. I think most of the Committee would have preferred to require rectal temperatures but, for dispensary and general hospital work, it seemed inadvisable because of the danger of infection.

It should be borne in mind that the result sought in the adoption and general use of these Standards, is the reduction of faulty diagnosis based on insufficient evidence and the accumulation for study of records which are uniform, so far as the clinical soundness of the diagnosis of tuberculosis, especially of the pulmonary form, is concerned.

REPORT

OF THE COMMITTEE ON EDUCATION FOR STUDENT NURSES IN TUBERCULOSIS

Your committee begs to submit the following recommendations on tuberculosis education for nurses and wishes to assure you that it considers this meager equipment to be quite inadequate, but believes it is wiser to urge its introduction into the curricula of schools of nursing with some assurance of adoption, than to propose a more complete one which would fail of any consideration whatever in the great majority of schools and, therefore, would act rather as a deterring than as a stimulating influence. Moreover, it cannot be ignored that curricula in these schools are equally deficient in the study of mental and nervous diseases and diseases of infants and children, which render their graduates unqualified for the great fields of infant welfare, and school and mental hygiene.

In recognition of the unprecedented demands from many sources upon the schools and their tragically limited capacity for meeting them, it has seemed wise to limit this committee's recommendations to the following:

OUTLINE OF LECTURES

1. Prevalence of tuberculosis. Race. Climate. Urban and rural communities. Prevalence and decrease in various countries.
2. History of the present bacteriological and pathological conception of tuberculosis.
3. Sources and channels of tuberculous infection.
4. Predisposing causes of tuberculosis.
5. Pulmonary tuberculosis. Stages. Symptoms.
6. Surgical tuberculosis.
7. Sanatorium treatment of tuberculosis.
8. Medicinal and specific treatment of tuberculosis.
9. Dispensary treatment of tuberculosis.
10. Home treatment of tuberculosis.

PRACTICAL EXPERIENCE IN NURSING CARE OF TUBERCULOUS PATIENTS

Ambulant Patients

3 weeks to 6 weeks

Dispensary Service

1 — Preparation of a Tuberculosis Clinic
- Waiting Room
- Patient's Dressing Room
- Physician's Examining Room (Tuberculin Tray)
- Supplies

2 — Conducting a Tuberculosis Clinic
- Taking histories — physical and social
- T. P. R. and weight
- Preparation of patient for examination
- Instruction of patient in regard to treatment and prophylaxis.

3 — Treatments and Tests.

4 — Laboratory Examinations

5 — Visits to other institutions
- Open Air Schools
- Day Camps
- Preventoria
- Sanatoria
- Hospitals

6 — Use of Admission Bureau and Social Service Exchange
- Routine procedure or other methods of securing admission to institutions.

7 — Observation of arrested cases
- Follow-up care

Social Service Department

Special problems of relief
Suitable occupation for arrested cases
Invalid occupations
Entertainment

Home Care

Instruction of patient and family
Nursing Care
Examination of all contacts
Diet
Equipment for outdoor treatment
Practical Experience in Nursing Care of Tuberculous Patients.

Bed Patients

10 days to 2 weeks

1 — General Nursing Care of patients

2 — Attendance upon special treatments
- Strapping
- Aspiration
- Pneumothorax

3 — Care of dishes, utensils, skin, mouth, stools, urine, laundry.

4 — Care and disposal of sputum and hemorrhage

5 — Testing of urine and sputum under supervision in Clinical Laboratory.

6 — Fumigation and other cleansing processes.

7 — Attendance at autopsies.

This outline is less unsatisfactory than it would be were it not that postgraduate schools now exist in which prospective workers can round out their preparation, and each year more are being established and more students are entering them.

It is a significant fact that three national associations are considering

the question of curricula in schools of nursing at their 1916 annual meetings, i.e., The National Association for the Study and Prevention of Tuberculosis, The National Organization for Public Health Nursing, and the National League of Nursing Education, which has for five years maintained a Committee on Education which is doing conspicuously fine work toward the standardization of such courses. They are considering at this time a suggested introductory course in general public health nursing, submitted by the Standing Committee on Education of the National Organization for Public Health Nursing which proposes relatively less than the one we are presenting in behalf of tuberculosis.

A joint session has been held of several representatives of all three Committees at which the whole question of reorganization of curricula to include the much needed preparation for these newer fields of nursing was discussed.

At three sessions of the convention of the three National bodies in New Orleans last month the same subject was debated. While strong arguments were presented on both sides, the dominating opinion was quite obviously that only a *very* few schools are at present sufficiently equipped with clinical material, trained teachers, laboratories, libraries, or even hours for study and class work to warrant their attempting any material increase in preparation for special fields. Nevertheless, a unanimous rising vote of the National League of Nursing Education pledged every member present to return to her State and urge all superintendents of Training Schools to try to include the very limited outline of lectures and field work submitted and urged by the Standing Committee on Public Health Nursing Education of the National Organization for Public Health Nursing. That body considers this the most important of all actions taken.

It is generally believed that only evil can accrue from most efforts to add new obligations to what are already sadly inefficient courses in technical nursing before the latter have been materially improved. Other schools attached to large general hospitals argue that it is impossible to give their students all that is available to them within their institutions in a three year course and, therefore, they are not warranted in attempting to do more. Furthermore, there is an honest doubt in the minds of many leaders in nursing education whether it will ever be desirable to do more than provide a sound and liberal education in technical nursing in the undergraduate schools. It was strongly urged, however, that the present status of Training Schools is largely due to an economic pressure which, if removed, would make possible much that is now so sadly lacking or impossible.

In a letter recently received from Miss Parsons of the Massachusetts General Hospital, she says, "My personal belief is that at the bottom it is largely an economic question. There is, in my own mind, no doubt but that a considerable portion of the time now spent by student nurses in the hospital is spent doing work that has no more educational value than the making of large numbers of empty beds, carbolization of mat-

tresses, dusting ward furniture, etc., that might better be done by maids, releasing those pupil nurses for the care of the sick who are greatly in need of their care. This judgment is shared by many others."

On the other hand, it is gratifying to state that a few schools are already giving their students more than the standard minimum curriculum which the National League of Nursing Education is constructing and it recommends as much on the subject of tuberculosis as this report calls for though it is correlated with various subjects and for that reason does not appear in as tangible form as the outline herewith submitted. This proposed curriculum gives consideration to tuberculosis in the following courses:— Hygiene, Social and Economic Causes of Disease, Elements of Pathology, Surgical Nursing, Orthopedic Nursing (with exercises), Nursing in Diseases of Infants and Children, Advanced Dietetics (infant feeding, etc.), Operating Room Technic and Anæsthetics, Nursing in Communicable Diseases including tuberculosis, Modern Developments in Nursing, Public Health Nursing and Social Service, Nursing in Special Diseases (skin, occupational, and venereal), Municipal Sanitation and Public Health.

The National League of Nursing Education also endorses practical experience in special hospitals and dispensary service and observations in home care of the sick for *all* students whether or not preparing for public health work. Moreover, several of the most prominent schools have established affiliations with Schools of Philanthropy and Visiting Nurse Associations whereby they are able to give to specially qualified students an introductory course in public health and social service nursing. Nurses everywhere are watching these experiments, all of which are too new to have lent much guidance in the work of this committee.

The members of your Committee, after several canvasses of the subject through discussions of outlines submitted by referendum, have agreed in the following:

1st. That the prevalence of the disease and the world wide effort to control and eliminate it warrant a relatively great amount of time given to the subject both in theory and practice.

2nd. That while a few of the best schools are doing so and perhaps many others can in the near future improve their courses, the great majority are not and cannot be equipped to do so under present conditions.

3rd. That they and practically all Superintendents of Training Schools will cordially welcome all possible influence which The National Association for the Study and Prevention of Tuberculosis can and will exert toward affiliation of general hospitals with those devoted to the care of tuberculosis and all other special hospitals such as those for the care of mental and nervous diseases, acute contagious diseases, diseases of infants and children, and of eye, ear, nose and throat.

They also court the influence of this Association in behalf of better equipment, trained teachers, and shorter hours in schools of nursing, higher educational requirements for entrance and mandatory laws gov-

erning the practise of nursing. This they ask because they know that when large bodies of citizens realize the peculiar conditions under which nursing education is at present conducted, and the resulting inferior preparation of the nurse for her ever increasing responsibilities, they will make their voice heard on the directorates of hospitals and in State legislatures to the end that better conditions may prevail and better results be produced.

Respectfully submitted,

ELLA PHILLIPS CRANDALL, *Chairman.*
MARY BEARD,
BESS DAVIES,
EDNA L. FOLEY,
ANNIE W. GOODRICH.
CHLOE JACKSON,
VIRGINIA MARTIN,
ROSALIND MACKAY,
ALICE E. STEWART,
HELENE STEWART,
A. K. SUTTON,
CAROLYN VAN BLARCOM,

ADVISORY COUNCIL

Chairman

LIVINGSTON FARRAND, M.D.

Boulder, Colo.

INTRODUCTORY REMARKS

THE CHAIRMAN: In the early days of the association the Advisory Council was organized with the idea of affording an agency through which the official representatives of States, counties, and municipalities, of institutions, and of the local associations affiliated with the National Association, might come together in a more or less official capacity. As so often happens the development of the plan that was devised for a specific purpose has been quite different from that which its founders had forecast. As the years have gone by, the Advisory Council has created for itself a sort of tradition by which its annual meeting has become an occasion, where from year to year some phase of the anti-tuberculosis campaign of particular significance at the moment shall be presented and discussed at length and with some formality.

You are all of you perfectly familiar with the course and development of the general campaign against tuberculosis which has been conducted since the organization of the National Association. Those of us who participated at the birth of this Society will remember how we were imbued with the idea that the one task at the moment was the education of the public with regard to the facts of the disease, and practically all of our energy was turned toward that end. Thus, the early efforts of the National Association concerned themselves chiefly with presenting certain facts to the public.

Very shortly we began to see the need of institutional establishments and we took up that sanatorium idea which for a time filled our mental horizon. In 1908, at the International Congress held here in Washington, it was extremely interesting to see how the technical and lay discussions of that Congress concentrated upon the idea that the great need of the moment was increased facilities for the care of advanced patients. Thus the emphasis has shifted from year to year and while never relaxing the efforts along original lines, the campaign has broadened out until it has brought itself into touch with all those movements for the prevention of disease which are gradually being brought together under the general term of public health and preventive medicine. I sometimes feel that the benefits of this extraordinary anti-tuberculosis movement have been greater in what might be termed the incidental fields, or as I have heard them called, "the by-products of the anti-tuberculosis campaign," than in the results of the effort that has been made to counteract the ravages of one single disease. I think there are many who have looked forward to the day when this well organized, well manned, and now firmly established and entrenched movement should be the nucleus about which those other movements for the prevention of preventable disease and for the improve-

ment of public health and hygiene might center, and that they all might finally merge into a single irresistible agency for the reduction of misery and the improvement of mankind.

Now, as we have done the obvious, as we have attacked those problems which have presented themselves and which have claimed attention, we have come to see that there are certain fundamental conditions underlying them all which cannot be disregarded. We have known from the beginning that this disease, tuberculosis, was just as much a social as it was a medical problem, and therefore could not be treated from the exclusively clinical point of view. As a matter of fact the secret of the success of the movement has been the bringing together of a professional class — the physicians — and the laity in what is undoubtedly the most successful enterprise of this nature which the country has seen.

Of the underlying social aspects we have always been aware, but we have been more and more impressed in these later years that it was the problem of housing, and the problem of working conditions, and the whole economic phase which was being neglected, and against which no really successful attack was being made, except here and there in a sporadic way. For that reason the Directors of the National Association decided that for this evening the topic which should be brought to the attention of our members should be that of Housing, and it was equally inevitable that when that subject was chosen for discussion they should turn to the man whom we have all learned to know as the guide in the entire housing movement of the country, Mr. Lawrence Veiller, the Secretary of the National Housing Association. He is also, let me say, a man of experience in the tuberculosis problem, for he has been for many years the secretary of the well-known New York Tuberculosis Committee. I take great pleasure in introducing Mr. Lawrence Veiller of New York, who will speak upon "Housing and Tuberculosis."

HOUSING AND TUBERCULOSIS

By Lawrence Veiller,

New York

I suppose the inclusion in the program to-night of the topic of Housing and Tuberculosis after it was discussed so fully at the annual meeting of this Association at Seattle last year, is an answer itself to the question that is so frequently asked, "Is there any real relation between housing and tuberculosis?"

There are many men who are quite content with the knowledge of things that they gather through their senses, and there are other men who want very precise and exact scientific information, who want everything weighed in almost a chemical balance and who are not quite satisfied unless they can get a theorem that will express a law or a principle, or unless they can have the weight of authority, law and precedent behind everything they do.

I am not referring to the medical profession at the present time. I am referring to a group in the laity, in my own profession of social worker. It is largely for the benefit of that group of men with what might be called meticulous minds that I am going to take your time for a few moments this evening and try to settle for all time, not from my words, but by citing authorities, this question of whether there is any real, intimate, deep relation between bad housing and tuberculosis, and I am going to start by referring you to a man who probably is better known for his work in the tuberculosis movement in America than any other one man, a man who was to a large extent a pioneer, a man who had the vision to see what was coming before a great many others saw it, and the man whose judicial temperament and scientific mind have gradually and patiently worked away at this one subject until he has brought about the great results that we have all seen. I refer to Dr. Hermann M. Biggs of New York.

We can take anything that comes from Dr. Biggs as being sound in medicine, and sound in every other way. As early as 1900, that is sixteen years ago, Dr. Biggs had these things to say on the subject of the relation of housing to tuberculosis:

"While tuberculosis in all countries has always been particularly prevalent among the laboring classes, its prevalence is greatest in certain great centers of population, where many of the tenement house districts afford the conditions which especially tend to its development and extension. The density of population always bears a more or less constant ratio to the prevalence of this disease, the mortality increasing with an increasing density. . . . The lack of light, air and proper ventilation in the dwellings, combined with insufficient or improper food, and too often with

dissipation among the inmates, induce the conditions in human beings under which the tuberculous diseases develop most luxuriantly. The conditions found in the average New York tenement and lodging house districts present all these objectionable features in a striking degree."

Again:

"Experimental investigations have shown clearly enough that the tubercle bacillus — the only necessary factor in the production of tuberculosis — is readily destroyed by sunlight, or even diffused daylight, and in this, as in all other communicable diseases, the danger of infection is largely diminished by thorough ventilation, because of its influence in diluting the infectious material. But in too many of the houses in New York City there is never sufficiently thorough cleaning to remove the infection, and sunlight, daylight and fresh air sufficient to destroy the tubercle bacilli cannot enter. Therefore, in the absence of radical measures for renovation or disinfection, there is every reason to expect the continued prevalence of tuberculosis among the occupants, and the permanent residence of the disease in a house when once it has been introduced, however frequently the occupants of the house may change."

Dr. Biggs also points out that nearly one-third of all the deaths among the tenement house population during the age period from 15 to 65 are due to this cause.

One of the most striking demonstrations of the relation between housing and tuberculosis was the pioneer work done by the New York City Department of Health in 1894 at the suggestion of Dr. Biggs, when a series of maps was prepared showing by means of colored dots the undue prevalence of this disease in certain houses. These maps showed that on a single street block as many as 102 cases had been reported within a period of four and three-quarter years, and as many as 24 cases in a single house. On one block on the lower east side in New York, viz., that bounded by Cherry, Market, Catherine and Monroe Streets, with a population at that time of 3,688 people, there were 241 cases of tuberculosis.

In 1898 the Medical Officer of Health of the city of London in his annual report presented a series of tables showing the influence of overcrowding on the mortality from pulmonary tuberculosis. The city was divided into districts for purposes of this study with reference to the proportion of the population living more than two in a room, that being deemed to be a condition of serious overcrowding. The facts presented are striking.

In those districts with under 10 per cent. of overcrowding the phthisis death rate for the year 1898 was as low as 1.10 per 1000, while in districts with 35 per cent. of overcrowding the death rate was 2.42 per 1000. These were the two extremes. The tables show similar variations for every stage of overcrowding, in districts with 15 per cent., in districts with 20 per cent. and so on up to 35 per cent. and over.

Similar tables presented in this important report show that at each age period the phthisis death rate had similarly advanced in the overcrowded districts, *and that in the most overcrowded districts the mortality from*

phthisis was more than three times that obtaining in the less crowded districts.

Dr. Biggs in this valuable paper of his entitled "Tuberculosis and the Tenement House Problem," written in 1900,* says:

"The prevalence of tuberculosis in the tenement houses and lodging houses of New York City may be greatly restricted, and finally, under proper conditions, I believe it would be possible to almost suppress it. To accomplish this end three classes of measures are necessary:

"*First* — Those which will so improve the sanitary conditions under which the laboring classes live, that they themselves will, because of their better physical condition, become less susceptible to the disease, and at the same time because of their improved surroundings they will be less exposed to infection, because of less overcrowding, more sunlight, more air, and better ventilation in their dwellings.

"*Second* — Those which will improve the sanitary conditions under which the laboring classes work (including the so-called noxious trades), so as to provide sufficient light, air, space and ventilation, and the proper general sanitary surroundings in the workrooms, workshops, etc., of the city.

"*Third* — Those which will diminish the exposure of the tenement house population to infection, through the removal of the sources of infection, brought about by the exercise of greater care on the part of consumptives in the disposal of their expectoration, and by more general, thorough and universal disinfection or renovation of apartments which have been occupied by consumptives, and so may have become infected."

Dr. Biggs goes on to say:

"Under the first heading it is first of all essential that the regulations against overcrowding shall be strictly enforced everywhere, and under all conditions, at least 600 cubic feet of air space being provided for every adult in a tenement house, and at least 400 for every child. Every apartment should be provided with through and through ventilation, and there should be sufficient space in the rear of the house to insure this, and also to render possible the entrance of sunlight, daylight and fresh air."

He therefore recommended block ventilation, halls sufficiently wide for light and air, and so as to be properly ventilated, to limit all houses to 60 per cent. of the lot, proper toilet facilities, dry cellars, good drainage and sanitary plumbing.

How important this method of attack was in the mind of Dr. Biggs as compared with the establishment of sanatoria and hospitals for the treatment of those sick with the disease is shown in the following significant statement made by him sixteen years ago:

"While I feel strongly the need of establishing State institutions and city institutions for the care of the incipient cases of tuberculosis in properly selected localities — the Adirondacks and elsewhere — I cannot but feel that this measure is of far less relative importance than those which

* "The Tenement House Problem" — deForest and Veiller. Macmillan Co.

look directly to the prevention of the disease by the establishment and enforcement of proper regulations.

"There has been a reduction in the mortality from the tuberculous diseases in New York City since 1886 of 35 per cent., and I have no hesitation in saying that I believe, with a complete and efficient scheme for dealing with pulmonary tuberculosis, including necessary improvements in the housing of the tenement house population, suitable hospital accommodations, and the proper enforcement of precautionary measures, the death rate from tuberculous diseases in New York City may be further reduced one-third within a period of five years. This would mean the saving of 3000 lives annually. No other measures offer promise of such large returns in the diminution of suffering and death, as those which look to the prevention of tuberculosis in the tenement houses."

Now, so much for Biggs. Let me cite a foreign authority. Lagneau, some years earlier, showed from statistics collected in 662 cities in France that the denser the population, the greater is the number of deaths from tuberculosis. That while the death rate from tuberculosis per one thousand population in cities of 5000 inhabitants was 1.81 and in cities of 10,000, 2.16; in cities of 20,000 it was 2.71; in cities of 30,000 it was 2.88; in cities of 100,000 it was 3.05; in cities of 450,000 it was 3.63, and in Paris, with upwards of 3,000,000, the death rate per 1000 rose to 4.90.

In addition, let me cite the report of the Health of Towns Commission for Great Britain showing the facts in regard to the Scotch city of Dundee, from which it appears that the rate of phthisis and other similar diseases increased with the overcrowding in dwellings. Taking the ratio of four rooms and upwards as 10, it was found that for three rooms the rate was 17, for two rooms 20, and for one room 23.

Let us now turn to other British authorities:

In a recent study of the whole subject made by Dr. A. Maxwell Williamson, Medical Officer of Health to the City of Edinburgh (published in the British Journal of Tuberculosis for July, 1915), Dr. Williamson says:

"I shall attempt to uphold the proposition that the number of cases of pulmonary tuberculosis in any district is almost precisely in direct proportion to the number of houses of one and two apartments which exist in it." (In Great Britain the term "house" is applied to the apartment or letting, and means what we in America would call flat or apartment.)

In a series of elaborate tables and diagrams Dr. Williamson showed that in the city of Edinburgh during the years 1910-1911-1912, the period under consideration, that while one per 1000 of the population were attacked by the disease in flats of four and more rooms, 2.1 per 1000 was the rate in houses with three-room flats, 3.4 in houses of two-room flats, and 6.1 in houses of one-room, and he very appropriately says:

"Clearly, therefore, the disease increases with rapid strides in proportion as the house accommodation becomes more limited and objectionable."

A study by wards in the city of Edinburgh showed similar facts. But the vital relation between overcrowding and tuberculosis was even more

strongly shown by the study made by Dr. Williamson of the conditions in three Scottish cities, Edinburgh, Glasgow and Greenock. He says:

"In Greenock, for example, there were 87 deaths in houses of four rooms and upwards, 106 in three, 179 in two, and 222 per 100,000 in houses of one room. In Glasgow, while there were 70 deaths in houses of four rooms and upwards, there were 120 in three, 180 in two and 240 in houses of one room; and in Edinburgh there were 56 deaths in houses of four rooms and upwards, 111 in three, 146 in two, and 225 deaths in houses of one apartment."

In similar fashion Dr. Williamson presents tables showing similar facts in eight of the large cities of Scotland dating back as far as 1856.

On the question of prevention as contrasted with cure Dr. Williamson utters these pregnant words:

"Is the hope of a successful crusade to be chiefly based upon a clinical treatment of persons suffering from the disease, or of the still further and wider adoption of the preventive methods, the administration of which in the past has so successfully resulted in the reduction of death rates of all other forms of infectious disease? The sanatorium is a hospital, and its very existence is an admission of failure of preventive methods."

As to the folly of the system which we have similarly followed in a blind way in America, of spending large sums of money in attempting to cure the condition of the patient by sending him to a hospital or sanatorium for several months and then allowing him to return to his same home environment, Dr. Williamson has this to say:

"After the lapse of a varying period — say from three to six months — the survivors are permitted to return to precisely the conditions where they formerly lived. I have within recent times given much attention to this particular phase of the question, and have been driven to the conclusion that the home conditions to which our sanatorium patients return after treatment cannot be expected to lead to any other result than an aggravation of the disease, and an undoing of the benefit which has accrued from sanatorium treatment within a longer or shorter period."

And again:

"*The key to the situation lies unquestionably in the housing question. If statistics prove anything, they prove to the hilt that the disease originates and thrives in direct proportion to the unsatisfactory nature of the house and its surroundings; and they prove invariably that an improvement in these conditions is followed, as by the law of cause and effect, by an immediate fall in the tuberculosis rate.* . . . Existing conditions especially must be actively dealt with. It seems largely to be beating the air if we continue to talk about town-planning schemes for the future while our dense, crowded, insanitary slums are found everywhere existing."

This article is of such great value that I cannot refrain from quoting Dr. Williamson's summary of his main points:

"1. Pulmonary tuberculosis is a disease which in 70 per cent. or 80 per cent. of cases occurs in houses of three rooms and under; the number of cases is larger in two-roomed houses than in three; larger in houses of

one room than in two; and the number of cases of tuberculosis disease increases almost in direct proportion to the number of small houses in any district or ward of a city.

"2. That since the year 1882 the number of deaths from tuberculosis has shown a rapid and steady decrease; and a like statement applies to the general death rate and the death rate from other forms of infectious disease.

"3. That this decrease has been taking place quite apart from, and irrespective of, any special effort to deal with the condition other than the preventive measures which have been carried out in the ordinary march of public health administration.

"4. That the establishment of sanatoria and dispensaries, while useful aids in carrying on a general crusade against this form of disease, are not of themselves likely to be attended by markedly beneficial results in the absence of other definite preventive measures.

"5. That preventive measures center largely in the housing question, and that, irrespective of cost, there is an urgent need, in the light of our present-day knowledge, of dealing more effectively than has heretofore been the case with congested areas, dense foci of population, and insanitary dwellings."

This really classic report of Dr. Williamson's is one that every worker in the anti-tuberculosis movement should become intimately familiar with. It is an armory of facts and arguments for him both in his fight against tuberculosis and in the fight against the slum.

You will find similar interesting discussions of this subject in the proceedings of the tuberculosis congress held at Leeds in the year 1914, and especially important statements made at that time by Sir William Younger and Sir Robert Philip. I might also refer you to the very interesting discussion of this subject at Seattle last summer at the meeting of our own Association and republished in the *Journal of the Outdoor Life* as recently as March of this year.

I commend to your attention there the statement made by Dr. Brewer of Ithaca, especially where he calls attention to the fact that army officers noted that Indians in the old days on the reservations were practically free from tuberculosis, but when they commenced to live in houses they rapidly developed tuberculosis to a very extraordinary degree, and I would especially recommend to your representatives as ammunition to use in this whole campaign the striking statements made by Mrs. Albion Fellows Bacon, published in that issue of the *Journal of the Outdoor Life*. Mrs. Bacon has a wonderful dramatic sense of expression that is denied to most of us, and I am sure that all of you if you read over her article again will get a realization of what conditions of living are and what they mean to the whole tuberculosis movement — a realization that could not be obtained in any other way.

I hope, Mr. Chairman, with this citation of authorities and precedents that I have cited enough to convince the most doubting members of our group that there is plenty of authority of the right kind to show the very

close and intimate relation between housing and tuberculosis, and if you will permit me I would like to proceed to what I am sure you will expect of me, namely, an enunciation of the methods by which we may achieve housing reform.

Your Chairman has very well stated the degrees of emphasis that have been laid upon the different phases of the anti-tuberculosis movement in the ten years of the life of this organization, and I want to say as an ardent advocate of housing reform that I think the leaders in that movement were entirely right, that it would have been most unwise at the beginning to have concentrated their attention upon such fundamental and basic things as the removal of the conditions and causes that produce tuberculosis, such as bad housing, and that they were very wise to concentrate their best efforts on making the whole public throughout the United States know the facts about tuberculosis.

They were equally wise later in their campaign for sanatoria and in more recent years in urging provision for proper hospital accommodation for advanced cases, and I agree that the time has now come when the movement is so advanced that they can wisely take up and consider the fundamental question of removing the causes of tuberculosis. To my mind bad housing is the first thing to attack. It is more important to secure better home conditions even than it is to secure better working conditions.

Most of us are in the home more than we are in the shop; the wage-earner is the only one in the shop, the whole family is in the home; the children, the growing generation, are in the home, so that we really need to begin with the home. Consequently it has been a great privilege to be invited here to-night to have this opportunity of outlining, in the time at my disposal, only very sketchily, as I may, because the subject is a large one, some ways in which I think we can achieve housing reform in this country.

I am not going to suggest the methods that have been suggested this afternoon, of subsidy — of subsidizing all the people that cannot make housing pay. Not for a moment, I assure you.

Now the broad question is: If there is this intimate relation between bad housing and tuberculosis, what are we to do to get rid of the slums? How are we to achieve housing reform? Well, the first thing is to find out the facts. You may be a little bit surprised that I suggest this. Most of you think, I imagine, that the facts are known. You know the facts so well about the tuberculosis movement that it seems rather strange to you that the facts should not be known about bad housing. You will be shocked to learn that there is hardly a city in America, certainly you could count them on the fingers of both hands, where the people of that city know the facts or where even a small group of people in that city know the facts, or where even the public officials know the facts, or where even the health officers know the facts about their own housing conditions. Literally you can count them on the fingers of two hands.

The National Housing Association recently published a pamphlet called

"What Our Cities Do Not Know." It did not start out to discover how few cities knew the facts. On the contrary, it hoped and expected that the cities to which it sent its questionnaire would report some very interesting facts, but the whole trend and the dominant note in the return of that questionnaire was that they did not know the most important things; such vital things as "How many dark rooms there are?" I mean windowless rooms, Mr. Chairman; rooms like closets; black holes. They did not know how many rooms of this type they had in their city. They did not know how many privy vaults; how many people, or how many families, living underground in cellar dwellings, they had in their cities. They did not know how many tenement houses were being built. They did not know whether the trend of construction was tenement houses or single dwellings. I do not mean to say that there were not exceptions. Of course there were some cities that knew pretty well what was going on, but the number was very few.

We had another striking illustration recently of our lack of knowledge. The Sage Foundation, three years ago, started a similar inquiry of the health departments of the larger cities on a number of vital points. They did not relate to housing, but they related to the whole method of organization of the health work of each community; their appropriations, their staff; whether they did infant welfare work; whether they did housing; what kind of milk work they did. They took about eight or ten of the great big leading branches of health work in a live, up-to-date department, and they asked what they were doing about it, and the result was to show conditions which were really a disgrace to a country like America. So we had as the dominant note of that report a statement that the health work of the United States is still in its infancy, and any of us who have had occasion to study it know it. Of course, there are very notable exceptions to this, but we do know that the great mass of the health work, the local health work of the country, is still in its infancy.

This is all part of our state of sanitary unpreparedness. I had a further illustration of our lack of sanitary preparedness not long ago that I am sure will interest you. I wanted to circularize the health officers in the two hundred and fifty largest cities in the United States, cities having 25,000 population and over, and the letter that I was to send them was of such importance that it would not do to send a circular simply addressed to the health officer. It had to be addressed by name to them, so I blithely set out upon what I thought was the simple task of obtaining a list of the names of those health officers. I applied first to the American Public Health Association, an organization of public health officers that has been in existence for forty-five years. They had no list. Then I said, "Dr. Biggs, one of the leading health men in the country and the head of the New York State Board of Health, will have a list." He had no list. I said, "The New York City Health Department which leads the health departments throughout the world, will of course have a list;" they had no list. Then I thought, "Perhaps the U. S. Census Department will have it." They had none. I said,

"Of course, Dr. Blue will have it in the United States Public Health Service, as their job is to work with the local health officers all the time;" but they did not have it. Then I said, "I will try a woman; there is Julia Lathrop of the Children's Bureau; she will probably have one." She had none. Then we turned to The National Association for the Study and Prevention of Tuberculosis, which has been on the job ten years, and presumably would be close to the health officers of the country. It had no list. Then I said, "We will make a list," and I am glad to say that we now have our list. It was a very complex and difficult task. It required such intellectual grasp as would enable one to write a letter to the mayors of two hundred and fifty cities! It was an interesting illustration, was it not, of our lack of sanitary preparedness?

After finding out the facts, we need to make the community know the facts — a somewhat different thing, and our method of making the community know the facts is very much the method which has been the most characteristic note of the anti-tuberculosis movement — a widespread campaign of education, using all the methods that the tuberculosis workers have used — lectures, leaflets, moving pictures, exhibits — everything.

Only I would like to suggest a little closer scheme of organization in each community, because we are engaged in a somewhat different kind of campaign in housing work than in the tuberculosis movement. We are embarking on a campaign where we are going to be in a fight all the time, where we are antagonizing vested interests and other interests; where we are touching the pocket nerve of nearly every citizen. It is therefore a different kind of work from the work that has heretofore engaged the attention of the tuberculosis worker.

It is comparatively easy to get appropriations from city and State officials; it is comparatively easy to organize an educational campaign; it is comparatively easy to get more beds in hospitals and have sanatoria established. Difficult as all these things are, none of them has the same elements that a housing movement has, where you are every day treading on some man's toes and making him spend money, and possibly reducing his income. It is not only the man who owns the house, but it is everybody. It is a wonderful network. You hit the builder, and you hit all the allied interests that go with the builder — the architects, and all the building trades; the men that sell lumber, bricks, iron and steel. Therefore, we need in a successful educational campaign in housing work to organize a little bit more minutely than we do in the tuberculosis movement.

I should like to offer the following suggestions as to methods of organization: That in any given community, we divide the city up into districts, just as the politicians would; that we appoint the equivalent of an election captain in each district, that we have a house to house canvass, and make it the business of our captains and their lieutenants and aides to visit every house and interview every householder and talk housing to him, and then make a card catalogue and record in that where each man and woman stands on the question of housing reform, either for or

against it; what his interests are and his political power, and whether he will help, and to what extent, when you need his help. It is wasteful to call upon him and give him your literature and then lose all that valuable information. Let us spend a little more money and get an index that will be of use to us.

I would suggest next that we prepare a standard educational leaflet that can be distributed widely, I mean by the hundred thousand, and then also what we call a "throw-away," a little one-page cheap paper thing that you get out for a mass meeting, or a political campaign; just one idea in it that will get over quickly, in big type, and put in language of the street, not in technical language.

Then, of course, we should unite the civic and social organizations of the whole town in a permanent organization, a sort of housing conference. I do not mean to suggest that they be made the active organization that is going to run this campaign. For that you need a separate Housing Association, a small compact group. But you need to bring into very close touch, in a sort of federation, all the different agencies in the town that would be likely to help, that have a legitimate interest at stake.

Further, I suggest appointing what I call "slum guides." By that I mean men or women who would be willing as volunteers to take groups of two or three around the town and show them the bad conditions. There is nothing like first-hand contact. I had a very forcible illustration of that two years ago, when an editor of one of our great metropolitan dailies said to me, "Veiller, do you remember that time about fifteen years ago when you took a lot of us editors around and showed us tenement condition?" and added, "Do you know, I haven't gotten the smell of some of those vaults out of my nose yet." That was exactly the effect I desired to accomplish. It is essential that the people should know at first hand the actual housing conditions. They will not believe that such conditions exist if you only tell them about it.

Of course, the newspapers have to be yoked to the movement right at the start. I do not mean the reporters; I mean the men who control the policies of the papers. They should be taken around, just as I have suggested, and shown the conditions, not to write up anything, but so they will know them at first hand, so that later on when some builder or real estate group comes to them and says, "Why, these reformers are impracticable and visionary, and theoretical," the newspaper editor will remember the dark rooms that he saw and will remember the people living in that cellar, and the smell of that vault, and will accordingly discount the arguments presented by the vested interests that are adversely affected.

Once a year you ought to hold in every town a Housing Institute, a one-day conference, where people can discuss all the live phases of the housing problem in your town.

In a word — it is your business to spread the knowledge of conditions throughout the whole community, so that there will be an irresistible demand for housing reform.

So much for the methods of educating people. Our next step is to

adopt a housing program, and the first item in that housing program is to attack the slums. Many of us are interested in building houses; many of us are interested in Garden Suburbs. Many of us are interested in improving transit facilities. All these are important phases of housing reform; but, approaching this as we do from the point of view of the welfare of the community, we have no right to tackle those jobs first. We must first wage our fight against the slum. That is the thing that is dragging down the population. That is the thing that is injuring the health of the community; that is the thing that is manufacturing tuberculosis, increasing crime, adding to poverty and causing the whole bad trend in the community against which we must set the tide.

Now, stating it very briefly, here are some of the main evils in our slums that we have to attack: privy vaults, dark rooms, inadequate garbage and rubbish collection, the destruction of uninhabitable houses, stables in residence districts, removing unsightly, dilapidated, disease-breeding outbuildings, wooden sheds and things of that sort, abolishing cellar rooms, providing adequate water supply and adequate yard drainage, doing away with room overcrowding and with the lodger evil. It is a big problem. These are but eight items, as I have very quickly stated them, in our attack on the slum. We will recur to them for just a moment because my time is very limited.

First, the evil of the privy vault: This is a relic of barbarism, and yet the vault exists in perfectly astounding numbers in our large cities. St. Louis has 20,000 vaults to-day; Baltimore had never had any sewer system until about three years ago; I might go on and cite similar conditions for many cities in the United States. We know what the vault means from the disease point of view in the spread of disease through the common house fly. The vault is the most potent menace from a health point of view that American cities face to-day. It undermines and saps the vitality of the people who live around it, and is a vital factor in our tuberculosis fight.

Second, the dark room: There are thousands of buildings with dark rooms in them, all over the country. We find them even on the prairies with the nearest town miles away, simply because builders are stupid and people do not know the danger of them. Every dark room must be eliminated, but before we can do that we have to locate them, and the health officers do not even know where they are. So, that is the first thing for our anti-tuberculosis associations to take up, to find out how many dark rooms there are, and where they are; to make your health officer know about them and then remove them.

Third, room overcrowding: You will recall what Dr. Biggs and the other authorities had to say about room overcrowding and its relation to tuberculosis. It is a more potent factor in the development of disease even than the dark room.

What has America done up to the present time in regard to the evil of room overcrowding? We stand convicted — Nothing. There is not a community, there is not a city, there is not a State in the United States

that has done one single thing of an effective nature to grapple with the problem of room overcrowding, and it is a colossal problem. It is time we took it up. The great city of New York ought to lead in a campaign against the overcrowding of its tenement rooms.

Now the next item on my program is a study of the health department and its work in each community. Your Chairman said that he thought he voiced the views of many when he said that probably the most effective results of the anti-tuberculosis movement had been in its by-products. In other words, we have been waging a movement for general health, we have been preaching the things that make for health, whether they affect tuberculosis specifically or not. So in this housing movement you will find a very interesting number of by-products. You cannot possibly achieve housing reform in any city unless you have an efficient health department. You can draft the most perfect laws in the world and get them passed if you are lucky enough, and know how, but they are little good unless they are enforced, and in most of our cities we have not yet a scheme of organization of our health departments that is capable of enforcing housing laws adequately. Most of our local health officers have not thought of the subject at all. A number of them, quite a considerable proportion of them, do not believe that housing is part of their work. I think, however, we can convince them that it is if we simply ask them, if it is not their work, whose work is it? They would at once see that it does not belong to the fire department, nor to the department of parks, nor education, and as they go through the list of the city departments, they will find that the logical and natural place for housing work is in the health department.

When you study the work of your health department and its ability to perform housing work you will be shocked to find how little organized it is to do tuberculosis work. I am afraid that most of us must plead guilty to being satisfied too easily with the intellectual discussion of things and the recording of them on paper, and that we do not often enough make a qualitative analysis of the work that we have been urging and agitating for years and see how it is being done, to determine whether we are really getting the results that we set out to get, whether we are remedying the conditions that led us to take up our work. I fear we must all plead guilty to that indictment.

It is of vital importance for us to make such a qualitative study of the work of the health department, not only on the housing side, but on the tuberculosis side, as well, and when we do that we shall find that the average health officer is trying to lift himself by his bootstraps. He is trying to do a job that he cannot possibly do, because he has a totally inadequate force, trying as they tried in New York a few years ago to visit the homes, or as I recall it — I am speaking from memory — to visit the homes of 20,000 tuberculosis sufferers in the tenements, scattered all through the great city of New York, with a staff of something like fifty nurses. What they needed for it was a staff of two hundred and fifty nurses.

So you will find in all these cities that they are doing their housing work as they get to it, with one inspector or two inspectors, or with the casual time that is left to their ordinary inspectors when they get through tacking up notices of scarlet fever, diphtheria, or other work.

Then your study will lead you to this other phase,— you see we are getting into the whole civic reform movement; that is one of the interesting things about housing, it has such varied ramifications — and that is the question of the enforcement of the laws by the courts. You are really powerless when you come to think of it, unless you have proper enforcement by the courts. The health officer may issue orders; he may threaten, he may give notice, but he cannot really do anything. In nine cases out of ten he is dependent on the courts as the last resort, and in most of our cities I am sorry to say that our minor courts take the position that if a man complies with the law, no matter if he has been delaying three months and people have been greatly suffering, and the city has spent a large sum of money in its inspections and reinspections, why even after all that if the man comes into court and says, "I have complied now," the average judge takes the position, "We are not here to collect revenue for the city and we are not going to penalize and fine this man."

You will find as you study this question that there needs to be a complete change in the attitude of the judges of our minor courts on this whole question. But that is merely a matter of education. It is very simple to change that attitude by letting the judges see the social significance of the conditions which the health officer is trying to combat. Similarly, you will need a proper legal equipment; most health departments have no legal staff, but just get the tag ends of interest that the law department of the city is able to give them.

Then a very important phase of your housing program is the education of the tenants. Dr. Hastings, in his discussion of this subject last year at Seattle, rather took the point of view that no matter whether the housing conditions were good, the people might change them very readily, and that the habits and the character of the people, of the tenants themselves, had very much to do with the conditions, and of course, he is right. Both things have very much to do with it.

Now, I know it seems a little bit like paternalism, it seems a little un-American, to suggest that we have to educate any considerable portion of our population to right habits of living, but we all know that the average tenement house dweller, the average person who lives in what we call the congested quarters or the poorer quarters of our cities, is very often a foreigner who is ignorant of our language and our institutions, who does not even know there is such a thing as a Board of Health, who does not know that he has a right to complain and who is generally ignorant as to American methods of living. He does not know what water closets are, nor does he know the consequences of stuffing them up, nor that it is going to make people sick if he throws garbage out into the yard.

The strong arm of the law is not very effective with a man of this kind, but a little education will do wonders. We are doing just this in New

York City, we are getting out a little pamphlet that "gets over," and we distribute these in a systematic and sympathetic way. Great good also would come from a "white list" of tenements, so that social workers and others could place at the disposal of tenants information when they want a good house to look at number so and so Chestnut Street, that the house is well built, and the owner keeps it in good repair.

Similarly, it would be helpful if we could have a blacklist, if the law would permit, of tenants for the use of landlords, so that landlords could avoid taking into their houses disreputable tenants, who "beat" the rent, or who destroy property, for the good tenant always pays for that sort of loss; the landlord seldom pays it.

Then, I am optimistic enough to think that the day is approaching when we might undertake the education of janitors or housekeepers, and I am also going to suggest the education of builders, and even of architects. Now, just think of such simple things as this: The average woman in the tenement house, or in the dwelling of the poor, breaks her back washing dishes. Why? Because she has to bend way over to a sink about down there. (Indicating.) The legs are too short. It is easily remedied and it is only because the builder is stupid or the architect is stupid or the man who makes sinks is stupid. You will find that probably all you need to do is send one letter to the manufacturer of sinks, calling his attention to it, and he will make longer legs.

That great question — the housing of the single man, the lodging house problem, remains almost untouched in America. We have rightly been working for families first, we have rightly been giving our attention to the women and the children, but the time is coming when we must also give attention to the single man, because the conditions in these lodging houses are probably the most dangerous, certainly from the tuberculosis point of view, of any that we have. The common lodging house has been very aptly termed a nursery of crime and a hotbed of disease, and the terms are not exaggerated at all, I assure you.

Then I come to something that many people want to start with, and that is the building of houses, a very important thing to do in all communities, especially if there is a dearth or famine of house accommodations, as there is to-day in many New England and middle western cities. The seeing to it that the right type of house is provided and enough houses are provided at reasonable rents and also keeping rents down.

We may not overlook that approach to the ideal, the establishment of Garden Suburbs. Throughout Great Britain and on the Continent these are being rapidly developed and there is no reason why we should not establish garden suburbs in America for certain classes of our workmen, at any rate. We cannot, I fear, hope to do it for the unskilled workman, because he cannot afford it; the cost of development is too great. But we certainly can establish these methods of living for the higher paid mechanics, and it is time we took it up and did it.

Then there is that very important related movement, the establishment of residential and industrial districts in all our cities. We should bend

our energies in that direction too. It not only affects the poor, but it affects us, and the rich, and everybody. But how stupidly we have done things heretofore, how we have mixed up industries and homes. A man has established his home in a carefully selected residential district intending to spend the rest of his days there. Suddenly some man comes along and puts a public garage next to his house, ruins his property and ultimately drives him out. Until recently, we had thought we could not do anything about this in America. A few of us, however, have been working on it for the last five or six years, getting laws passed, but we have always been very much afraid what the last word would be from the United States Supreme Court. I am glad to say that we now have a decision from the United States Supreme Court of a most sweeping character, sustaining this as a proper exercise of the police power.

This means more for conditions of living in America than anything that has happened in twenty years. We are free now in any city of the country, if we go about it in the right way, to establish residential and industrial districts.

Another phase of housing we should undertake is the formation of companies to manage houses, what they call the Octavia Hill method, as practised in England and in this country in Philadelphia. The problems of management are quite different from those of construction, and a great many of the evils we encounter and the problems that we meet are due to bad management. Instead of leaving the management of these houses to be supplied by ignorant people who care only about extracting the last penny out of it, how much better it would be to substitute for that indifferent landlord, an intelligent and alert landlord.

And finally the time will come when we shall undertake the work of which they have done so much abroad, what they call their re-housing schemes; taking whole slum areas and cleaning them up. Of course, we should all like to start on it to-morrow. We all want to wipe out every vile slum, but it cannot be done over night. The legal questions are comparatively simple. It is the financial questions that are difficult. When you learn that one single block of land in New York City has a value of a million and a half dollars, and that it would take about six of those blocks to make a decent-sized small park, you can easily see that in a short time it would break the taxpayers' backs to carry out many re-housing schemes of this kind.

It would have been very easy to have spent the time that was allotted to me on any one of the topics that I have so sketchily outlined to you. That is one of the things that makes housing interesting. It leads you into by-paths.

Let me say in conclusion, that when the tuberculosis workers of the country have done the "few" things which I have outlined this evening, they may profitably turn their attention after that to the abolition of poverty, intemperance and all disease!

Mr. Chairman, as a "grizzled veteran" in the cause of housing reform, as I believe I was described recently, I want to say that we of the National

Housing Association welcome the tuberculosis workers of the country into the war against the slum and the fight for better homes.

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DISCUSSION ON PAPER BY MR. VEILLER

Courtenay Dinwiddie, Cincinnati: To follow Mr. Veiller, in discussing the relation of housing to tuberculosis and his outline of the housing problem, requires the assurance of the negro preacher who introduced his sermon one evening by saying, "Brethren and sisterin: I'm gwine to do three things this evenin'. First and foremost, I'm gwine to explain the unexplainable; second, I'm gwine to expound the unexpoundable; and third, I'm gwine to onscrew the unscrutable." But perhaps I can, from the point of view of the tuberculosis worker, throw a little light on the problem from a slightly different angle.

In the first place, there is a real difference of opinion between some as to the importance of the relation of housing to tuberculosis. Three years ago, at the Canadian Conference of Charities and Correction, a leading sanitarian introduced his paper on the subject of Housing and Tuberculosis by the sweeping assertion that there was no relation between the two. Two years ago, at a State conference on tuberculosis, a housing expert made the statement to the tuberculosis workers present that their concentration of effort upon the segregation and treatment of tuberculosis was a serious mistake, because they were starting at the wrong end of the problem. He supported his statement with some statistics, which to say the least, were of doubtful value.

We should strike a sensible balance between the opinion of those that believe that we can segregate all tuberculosis until we can banish the last lone tb. germ to some desert island, and that of the occasional housing reformer, who, dissatisfied with the excellent statistical ammunition ready to hand, similar to what Mr. Veiller has cited, tries to make some of his own of such exceedingly high power that it brings a recoil that is injurious to himself and his work. It is important that we should be clear as to what we do know about the relation of housing to tuberculosis, and it is im-

portant also that in pursuing the nimble statistic, we should, like our expeditionary force in Mexico, have a definite understanding as to what are the limitations, beyond which we cannot venture with profit.

Therefore, I shall supplement what Mr. Veiller has said by suggesting, as a basis for further discussion, what it seems to me, are the points that we know, as to the relation of housing to tuberculosis, and probable limitations as to the facts which we can prove.

The first point that I should make is one which Mr. Veiller has most emphasized in his paper, namely: that a high incidence rate or a high death rate from tuberculosis is practically always coincident with bad housing conditions, whether we measure those conditions by overcrowding, by unsanitary buildings or accommodations, or by lack of cleanliness on the part of the tenants. Mr. Veiller gave you a great many interesting statistics on the relation of congestion to tuberculosis. I want to add a few resulting from the recent investigation made in Cincinnati, not as developing anything strikingly new, but because we went at it from a slightly different angle from the ordinary.

In connection with the Public Health Service's study of tuberculosis that was completed there recently, our Anti-Tuberculosis League undertook a special investigation. It had been claimed by a good many that probably a prime factor in the tuberculosis death rate there was the annual flooding of certain areas of the city. Mr. Meos of our staff, took three typical areas of the city; one included certain sections that were annually flooded; the other included adjacent sections that were closely similar but just outside of the flooded zone, and the third included several typical parts of our downtown tenement area. The population of those three areas was respectively 2,262, 1,897 and 1,249, and they were selected, without any previous knowledge as to their death rates, but because we believed them to be typical. So I think that they afforded a reasonably fair basis of comparison. Contrary to the view of those who held that the annual flooding was probably a large factor in tuberculosis, we found that in the flooded area the annual incidence rate of tuberculosis, taking an average of a five year period, was 1.11 to every 100 population. We found that in the adjacent non-flooded area the incidence rate was 1.26, and in the tenement area we found it to be 3.06, or almost three times as great as in the flooded area. The explanation is found in an analysis of the figures as to the character of the housing. In the flooded area the great majority of the families lived in one-family houses. In the area just outside the flooded section, the same condition existed, whereas, in the tenement area, only a small number of the families lived in one family houses and the great majority lived in houses accommodating from 2 to 8 families.

We all are familiar with the spot maps and shaded maps of different cities, showing the prevalence of tuberculosis, which correspond to, and, in fact, are almost identical with maps showing the location of bad houses and unsanitary conditions, privy vaults, etc.

Some of the most interesting statistics as to the relation of bad housing

to tuberculosis, among those figures which Mr. Veiller has cited, relate to cities in Scotland. He told you of the varying death rates among families living in one family houses, two family houses, and so on. Perhaps you may not all know that similar studies have been made in Glasgow for many years, and as far back as 1885. I was looking over a report not long ago in which, for that year, the death rate from "lung diseases" in Glasgow was given as 985 per 100,000 population, among families living in one room, as compared with the death rate of 328 among families living in four rooms or more.

It is interesting to note, in studying the Scottish statistics as to the relation of room overcrowding to tuberculosis, that in Edinburgh there is an almost constant ratio of 6 between the incidence rate among those living in one room to the same rate among those living in 4 rooms or more. In Glasgow this ratio between similar incidence rates is, without wide variation, about 3 plus, indicating that there are factors, of importance in their effect on tuberculosis, other than room overcrowding, which vary considerably between the two cities.

It is needless to cite further statistics. The conclusion is inevitable that there is a direct relation between bad housing and tuberculosis, and it is so direct, and so constant, that we are inclined to accept it as a corollary that bad housing is a most important predisposing cause of tuberculosis.

The second point that I should make is that the results of "clearance schemes" furnish the most conclusive scientific evidence that bad housing is a predisposing cause of tuberculosis. Important evidence has been accumulated by different authorities, as to the reduction in the death rate resulting from tearing down congested tenement areas and building up new, sanitary dwellings. The most important and interesting of all I have seen is that from Liverpool, for this reason, that the population studied in Liverpool, was almost identically the same in the rebuilt areas, as that in the old buildings which were torn down. The total population involved was about 6,000 persons. In the largest area affected, 2,500 persons were displaced and fully 71 per cent. of these moved into the new buildings. Therefore, these figures afford a basis for really intelligent comparison of the differing rates. This is not true of the population affected by "clearance schemes" in Glasgow and in other cities. Thompson is authority for the statement that in the areas dealt with in Liverpool, the death rate was about 60 to 1,000 population, and that in the new, sanitary dwellings it was about 25. For our purpose it is interesting to note that the tuberculosis death rate dropped from about 4 to 1.09 per 1,000.

I do not cite it as proof of the relation between housing and tuberculosis, but wish to mention an interesting bit of circumstantial evidence as to the effect of destroying congested tenement areas, which has been kindly given me by Mr. Van Blarcom, Secretary of the San Francisco Association for the Study and Prevention of Tuberculosis. In 1904 and 1905 the death rate from tuberculosis in San Francisco was approxi-

mately 309 per 100,000 population. On April 18, 1906, occurred the great San Francisco earthquake and fire. In 1906, the death rate from tuberculosis dropped from 309 per 100,000 to 210, and it not only dropped but it continued to drop, to 190 in 1911. There has been a slight increase since then, but only a slight increase. These figures are striking but should be used with caution as so many factors, such as excessive movement of population, are operative at such a time of stress.

The third point that I should make is that it is the almost universal testimony of trained housing inspectors and of those engaged in model tenement and Octavia Hill work, that improvement of housing conditions invariably brings about a higher standard of cleanliness and sanitation on the part of the tenant. Thompson, in his description of the Liverpool clearance scheme, said that this improvement was remarkable; that they not only kept their buildings in better condition, but they attended to almost every detail of sanitation, and even took pride in cleaning their brass letter plates and door handles. We are having the same experience with the model tenements in Cincinnati, which the Model Homes Company has built. That company is noting there, also, a lower mortality and morbidity rate among its tenants.

The fourth point that I should make is, that, while we have almost unlimited data, showing that bad housing is an important predisposing cause of tuberculosis, we have no definite information as to the relative importance as a cause of tuberculosis of the different factors of bad housing, such as poor ventilation, poor light, house infection, lack of proper accommodations, etc. It is within the range of possibility that we may be able to make such an evaluation, although some sanitarians may doubt whether that is not one of those meticulous questions to which Mr. Veiller referred. I believe that if we do make such a study, it will probably be in connection with a health center, such as has been proposed in Cincinnati and in several cities recently. In such a center intensive, concentrated effort on the part of both the public and private agencies, through a local staff representing them, will do the most adequate medical and social service work that can be done to eliminate tuberculosis and other diseases in a limited area in which conditions can be controlled as far as possible.

The fifth point that I should make is that we have no absolutely indisputable method of determining just what are the prime causes of tuberculosis in any given number of cases that we may study. This is true, and I believe always will continue to be so, because of the chronic nature of the disease, because of the lack of marked symptoms immediately upon incidence, and because of the frequent presence of several predisposing factors, in any given case. Take, for example, the study of tuberculosis to which I referred, which the United States Public Health Service made in Cincinnati recently. In classifying what were apparently the principal predisposing causes of tuberculosis, in a number of cases, Drs. Robinson and Wilson, the investigators, include poor housing and poverty in one heading, showing how difficult it is to separate those two fac-

tors. Then, in discussing "cases in which there was a history of tuberculosis in the family," cases probably due to family infection, they go on to explain that the lack of sufficient income is probably a very large factor. The family is not able to have sufficient accommodations, they are crowded in their quarters and have a close contact of the sick with the well, which they would not have under good housing conditions. Other effects are malnutrition and general lowering of standards of living. Probably bad housing and poverty, therefore, are very important factors coincident with a number of other predisposing factors which they cite as prime causes of tuberculosis.

It is not so vitally important that we are not able to separate these two inseparable twins, bad housing and poverty, or to determine the exact relative importance of the different factors of bad housing. Without, in any degree, minimizing the great importance of poverty as a predisposing cause of tuberculosis, we will all agree from the evidence that has been submitted that bad housing by itself is certainly a most important factor. I believe that it can be taken almost as axiomatic also, that unsanitary houses with a cheap rental, by making it possible for tenants to exist for less than the cost of decent living and, in marketing their labor, to underbid self respecting workingmen, have a depressing effect upon the wage scale and upon standards of living generally. In other words, bad housing not only is a cause of tuberculosis, but increases poverty, which, itself, is a most important predisposing factor. Therefore, we can never separate these two forces which react upon one another, namely: bad housing and poverty.

There is only one conclusion to the whole matter, and that is, the sooner we translate the vague generality of equal rights and opportunities for all into the practical reality of a home and garden for every family, the sooner we are going to solve our tuberculosis problem. Because we are attacking bad housing, we must by no means relax our efforts for segregation and treatment of tuberculosis. But, on the other hand, we must not become so absorbed in that segregation and treatment that we forget to try to eliminate one of the factors of tuberculosis, which the bad house surely is. We are convinced of this in Cincinnati, and the Anti-Tuberculosis League and the public officials who are handling tuberculosis, are concentrating every effort behind the housing movement.

I want to make it clear that because I may have criticized the too free use of startling and untested housing statistics, I do not, by any means, wish to criticize radicalism in housing reform. I hope some day, before I am too old, that I will find a community where housing reform is so radical that it has brought to any one, even the landlord, injury or injustice that can be compared with the benefits. When I have found it, I shall rejoice that we are making such progress that we have to set a speed limit.

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THE SEPARATION OF TUBERCULOSIS FROM GENERAL MEDICINE

By Thomas McCrae, M.D., F.R.C.P. (Lond.)

Philadelphia

When this address was first in contemplation the title which came to mind was "The Divorce of Tuberculosis from General Medicine," but second thoughts decided on the designation used above. Divorce signifies a complete severing of a union and such fortunately has not occurred in this case. But that some measure of separation has taken place it is useless to deny. That this has been an advantage to either side no one would claim, for both are losers.

There are many evidences of the cleavage which has come between general medicine and the most prevalent of all diseases, the one which keeps its place at the head of the mortality lists. It is a curious phenomenon and one for which it is not easy to give adequate reasons. It may be suggested that we have inherited an idea of a certain element of fatalism in our attitude to tuberculosis. Possibly the fact that it is often not recognized until the disease is far advanced may have some influence. No one wishes to fight a losing battle and the death rate shows that too often it proves to be this. How much interest is taken in a patient with pulmonary tuberculosis who goes to a general medical dispensary clinic or applies to a general hospital for admission? There may be some exceptions but as a rule the effort will be made to send him somewhere else in the case of the dispensary and in the case of the hospital he will not be admitted. Should he have some unusual condition, say a tuberculous pericarditis or peritonitis, the result will be very different. But you may say the patient with pulmonary tuberculosis is not welcomed because he is a danger, or his condition presents no special interest or he has a chronic condition which we cannot remedy. Does not this prove the truth of my title whatever the reasons may be? Under proper conditions he is no more a danger than the patient with typhoid fever; as to interest that is largely a question of those who are in attendance, and as to its being a chronic condition have we not many such constantly in our wards? Of course there are many diseases which we cannot remedy but we can at least do something to alleviate. We do not of necessity refuse such and close our wards to them.

The attitude of some members of the profession gives some additional light on the subject. Not long ago a prominent practitioner said to me that he thought a great mistake was being made in teaching the fact that tuberculosis was communicated from one individual to another. His ar-

gument was that the student and practitioner would so dread coming in contact with a patient with pulmonary tuberculosis that much harm would be done. He thought it much better to ignore the question of infection as far as possible. For most of us it is doubtless difficult to understand such an attitude. I have puzzled over it and am quite unable to get his point of view. It would certainly not tend to make him the best adviser to a patient with the disease. There is also the view that tuberculosis is a thing apart and that the general practitioner has not the ability to understand it properly. Now it is easy to realize that this view might be taken about certain special fields of work, as for example ophthalmology. Only those with special training can properly prescribe glasses for astigmatism or correct muscular disturbances, but here we are dealing with something which does not enter of necessity into the daily work of the general practitioner. Such an attitude regarding tuberculosis may be partly the result of insufficient training, but curiously enough this does not seem to apply to many other diseases. Those with insufficient training do not always hesitate for this reason to refrain from the effort to manage patients with other diseases of which they may not have a proper knowledge.

There are some men in general medicine who have not kept up with advances in the knowledge of tuberculosis and who consider that there has been nothing added since their young days. Unfortunately the same view is held by some teachers and such an attitude is reflected in those who come under their instruction. "It is the same old thing," I heard one teacher say, "there has really been no advance in our knowledge of tuberculosis in our generation." He was probably quite right in his opinion as applied to the one whom he knew best — himself.

Then there is the lack of knowledge of the disease among some members of the profession which is so often a tragedy. In some ways the laity is ahead in realization of conditions. A recent example was given by a dispensary patient who came asking for a diagnosis. He had coughed for several months and had been told by his physician that he had bronchitis and nothing more. The patient had suggested a sputum examination but was told that this was not necessary. It is evident which of these two men, patient and physician, showed the better knowledge. Read some of the letters in the *Journal of the Outdoor Life* and you have many like samples. None of us needs go far in his daily work to find many more. Probably all of you have read the paper presented by Dr. Ford * at the last meeting of this Association. It would be well if the humiliating lessons of his study could be impressed on every member of the profession. It is a problem why this should be so and yet one explanation must account for much of it — poor teaching. How else can we explain such a lack of efficiency? It is difficult to understand how a practitioner can refuse to see the danger signals unless we grant that he

* Does the General Practitioner Utilize the Means at his disposal for the Diagnosis of Early Pulmonary Tuberculosis? Trans. Nat. Assoc. for the Study and Prevention of Tuberculosis, 1915, XI, 108.

does not recognize them. Inherent laziness and lack of ordinary clinical efficiency may play a part, for the early diagnosis of tuberculosis may require much work and perseverance.

Some years ago I inspected a number of tuberculosis dispensaries and the conditions found were depressing, to say the least. A number of them did not have an examining room with sufficient light to make a proper inspection. If such a condition exists in a place supposed to be specially equipped for early diagnosis, is it any wonder that there should be carelessness in the early recognition of this disease in the hands of some of the profession?

Does it not seem an unfortunate fact that the disease which as regards frequency of occurrence stands at the head of the list should be regarded as a thing apart from the daily work of many of the profession? It is surprising, but yet we have a very similar situation in syphilis. It has been separated from general medicine for too long and there can be no more unfortunate beginning for the student of medicine than to regard it solely as a "genito-urinary disease." It rather seems as if here also we have a condition which requires attention. Syphilis should be regarded as a part of general medicine. Into which clinic of the hospital does syphilis not come? The same is true of tuberculosis. It has been said that to know syphilis thoroughly is to know all medicine and much the same might be said of tuberculosis. To discuss the many points of contact between tuberculosis and the many departments of medicine, would require a long paper in itself. The worker in every special department has to have a knowledge of tuberculosis as affecting his special domain. Does it not seem important, therefore, that every graduate in medicine should have a broad general knowledge of the disease? Take the problem of tuberculosis of the genito-urinary tract, a most difficult matter. A man is not able to handle this to the best advantage if he has not a good working acquaintance with the whole problem of the therapy of tuberculosis. Is it not time that general medicine made efforts to bring back the study and handling of these diseases to the place where they belong?

Consider the importance of a knowledge of tuberculosis in regard to diagnosis generally. Take that away and what kind of a training has any student had in his knowledge of pulmonary and pleural signs. Separate if you can what you learned in physical diagnosis from your study of tuberculosis and how much is left. And yet there are students of medicine to-day who may graduate without any special attention being given to this. I have been told that there are medical schools from which a student may graduate and possibly never have examined a patient with tuberculosis.

Of another important side of tuberculosis the same comment may be made. I refer to the social aspect. In some ways many physicians feel that this lies outside our province, but this cannot be true. The saying that the problem of tuberculosis is a social one is truth but not the whole truth. It is both a medical and a social problem and both sides — the

physician and the social worker — are losers when either forgets this fact. But who is the better director? We can answer who *should* be — the physician — but too often he is not and in this we have been remiss. Is it not time that we were awake to our responsibilities? Not infrequently when the physician and the social worker have come together I have felt that the latter had a much more complete knowledge of the problem which was to be solved.

It may be said that the separation is an advantage in that we have men devoting themselves to the particular study of this disease and more likely, therefore, to be efficient in its management. The last point is true, but how many of the patients with tuberculosis are likely to come into the hands of such men early. Only a very small proportion, for in the great majority of cases they come first under the observation of the general practitioner. Here is the most important part of the whole problem, for as has been well said, the general practitioner is "the man behind the gun in this fight." If he is not alive to the situation and does not recognize conditions early, what chance has the more specialized knowledge of the tuberculosis worker. A comparative condition is seen in appendicitis. No matter how much knowledge certain men had of the need for early recognition and surgical treatment, this could only be carried into practical effect when the profession as a whole learned the same lesson.

Another side to the question is the effect on the men working in tuberculosis. It is evident that there is, as in all specialties, some danger of them growing away from general medicine. That such may occur is naturally possible, but in my opinion the special workers in tuberculosis have kept more in touch with general medicine than the workers in general medicine have with tuberculosis. To their honor it should be said, for it is not always easy to keep up an interest in general problems when the day's work is filled with special ones. That there is a loss in the special worker in tuberculosis getting away from contact with general medicine is evident. The loss is both to himself and to general medicine, as in many things the stimulus of each is important to the other. This point has been specially brought home to myself from the experience of having a department devoted to tuberculosis in association with my clinic. There are several features which stand out. Naturally the question of early diagnosis comes up frequently in the general clinic, and we are able to utilize the special knowledge of the tuberculosis department. On the other hand there are a number of cases in which patients are sent to the tuberculosis department as cases of advanced tuberculosis * which prove to be something else. It is evident that in the study of these patients the general medical department is of assistance. Both sides gain from the mutual help.

* The beds in the tuberculosis department of the Jefferson Hospital are for advanced cases only and hence we have a large number of patients referred for admission with the diagnosis of advanced tuberculosis. The cases which prove to be something else form an interesting group and later we hope to report our experience as to errors in diagnosis among them.

Next comes the question as to how this condition of affairs is to be remedied. There is no quick method of improvement as I see the problem. The profession has had much preaching and admonition, doubtless with some result. But the solution seems to me that we must "catch them young." In other words we should start with the medical students. They should be given proper instruction so that at graduation they have as thorough knowledge of tuberculosis as it is possible to give them. For this to be done properly there are some dry bones to be clothed — and of some of them we may say, like the prophet, that they are very dry. In other words there are some teachers who need to have new ideas as to the importance of this question. Before you can expect the medical student to be instructed properly you must know that he has the teachers to do it. The head of a medical department who does not make certain that every student has the opportunity to acquire, at any rate, some first hand knowledge of tuberculosis, is failing in a very important duty. In some quarters there is a tendency to get away from routine clinical work. It is said by some that we should allow the student to study what he is interested in and not insist on certain work being done. That may do very well in regard to some subjects, but does not apply to tuberculosis and syphilis. Graduate a student without any proper knowledge of tuberculosis and if he is expected to practise medicine, he can be regarded as only a half-baked article. His training in physical diagnosis is deficient and he is lacking in a knowledge of the disease which he should know best. I should like to suggest that the Association could do no better piece of work for the study and prevention of tuberculosis than to investigate the teaching of tuberculosis in the medical schools of this country. It might result in some hard words but should be productive of much good.

The hospital problem is closely connected with the question of the teaching of tuberculosis. If a clinic has no beds to which patients with tuberculosis are admitted there will be little opportunity for thorough study of its problems. It may be said that the out-patient department supplies this lack, but while I have a very strong belief in the value of dispensary teaching, I do not believe that we can give proper instruction from it alone. We would hardly consider that a student could gain a proper knowledge of cardiac disorders from seeing patients only in the dispensary. It would be of great advantage to general medicine and tuberculosis if every general hospital had a department for tuberculosis. I know that it would be of great value to general medicine and I am sure that the special workers in tuberculosis would feel that their work would be aided.

With the purely medical knowledge of tuberculosis there should be instruction in its wider effects. This goes naturally with it and if a student by observation learns of the conditions, social and economic, which are associated with the disease his knowledge will be wider and his conception of the whole problem much more complete. As the twig is bent so is the tree inclined, and if the student does not learn, it is only the excep-

tional practitioner who will remedy the deficiency after he graduates.

Certain of the papers in the program of this Section are concerned with the problem which I have discussed. I hope that they will show that the study of tuberculosis does not necessarily become separated from general medicine. Two of the questions of particular interest are to be brought before us by Dr. Dock and Dr. Thayer. Several of the other papers discuss problems which are common to both. They illustrate on the one hand that the worker in general medicine may be interested in and throw light on the problem of tuberculosis and on the other hand how the special worker in tuberculosis may associate his work with that of general medicine. I hope that they may prove that the close association of tuberculosis with general medicine is desirable and something which we should all strive to retain.

THE RELATION OF THE GENERAL HOSPITAL TO TUBERCULOSIS

By George Dock, M.D.
St. Louis

The relation of the general hospital to tuberculosis has in recent years been of a kind that could not easily be defended. The policy was one of exclusion, so that in most hospitals "open" cases, in some all cases, of tuberculosis were not only unwelcome but were often formally excluded.

This attitude, of course, was only a reflex of the widespread teaching of the infectiousness, i.e., contagiousness, in ordinary understanding, easy communicability, of tuberculosis. A morbid fear of the disease pervaded all ranks of society. Lawmakers passed or tried to pass laws excluding tuberculous subjects from going from one State to another. Thousands of subjects in various stages of disease could engage in any occupation they pleased all over the country. They acted as cooks, sold or handled food, nursed babies, milked cows, made up berths in sleeping cars, and in other ways had a most intimate relation to the general health. Others traveled as they pleased, and yet with singular blindness to the contradiction, a few who were recognized by the skill of harbor physicians, or those too honest to deny their condition, were excluded from the country in one case, from hotels or even from renting domiciles in the other. In some places cadavers with closed tuberculosis, as of the meninges, had to be buried in air-tight caskets. In a State university with its own teaching hospital, the authorities refused to build a small model tuberculosis unit for combined teaching and treatment purposes, on the ground that the existence of such a plant would frighten students away from all departments of the institution, though not only in every ward of the hospital, but in every classroom of the university, there were known or unknown cases of open tuberculosis, openly or furtively projecting infectious sputum in all dark corners.

Much of this fear came from an error that is only slowly being abandoned. The proof of the infectiousness of tuberculosis was emphasized before the public with more energy and enthusiasm than skill. Exaggerated ideas of the ubiquity of tubercle bacilli, and of the ease of infection, were propagated in season and out of season. The propaganda, and the early efforts at segregation, had the natural results in an exaggerated fear, and this phthisiophobia still exists and will only slowly give way before well-founded and less alarming views. It was thought early, and properly, that sputum was the commonest and greatest source of danger, but the further conclusions were often erroneous. A commonly held opinion was

that the tuberculosis of adults, for example of nurses and house officers in general hospitals, was due to the sputum of tuberculous persons under their care. Two important series of facts materially weaken this view. One is the observation that a large proportion of all people in ordinary life acquire tuberculosis in childhood, and that the active symptoms appearing in early adult life are not due to recent infections, but to causes in the body. Another is the well attested fact that of all places, properly conducted tuberculosis sanatoria are those least likely to set up tuberculosis in the fairly healthy bodies of people leading a fairly healthy life. There are many details here that need further investigation, such as the large question of re-infection, but the final conclusion will be less pessimistic than the early belief.

The exclusion of tuberculosis formally from general hospitals had several results of far reaching importance.

Perhaps the most important was the loss to teaching. The commonest disease, a disease of the most diverse symptomatology, one requiring for its early detection the most expert care, could not properly be taught to medical students, because hardly any medical schools controlled institutions in which tuberculous patients were cared for. As this part is to be discussed by my colleague, Dr. Thayer, I shall not follow it farther, but shall consider some other features of the question. Tuberculous patients suffered, because they could not readily and near at home get the sort of treatment they needed, and that hospitals should furnish.

That the fear of such patients on the part of hospital authorities is irrational is not easy to demonstrate to all concerned. It is true that tuberculous subjects offer a risk to other patients and to the hospital personnel. But many other patients offer risks, too, yet there is very little effort, in many hospitals, to lessen these risks. How can one draw a line? Shall we say that pneumococcus diseases are free from danger, also influenza, typhoid, gonococcus infections, syphilis, and all the coccus infections? To ask the question answers it. Patients must be admitted, and the most perfect arrangements made for their harmlessness to others. The steps need not be detailed. They include the immobilization of infectious material as near the source as possible; the prevention of contact infection, direct or indirect; the cultivation of protective habits by hospital attendants, and the maintenance of such bodily resistance as will render infection difficult. The different infections, the different clinical forms of various infections demand variations in technic, but the principles are the same.

It can readily be admitted that it is not desirable to treat together infectious and non-infectious cases, but taking hospitals as they are, and long will be, complete segregation is not possible. In every hospital some tuberculous patients will be admitted for other conditions, or will remain for a time not accurately recognized. For these, the methods of treatment and prophylaxis must be carried out smoothly and perfectly.

Until every town and village has a tuberculosis hospital in or near it, every general hospital should have facilities for accepting such tuberculous patients as need its proper care, and in every stage. The measures useful

for a case admitted under mistaken diagnosis are equally useful for the incipient case that cannot get to a sanatorium and has no other way of learning how to live.

The care necessary for a late stage case admitted for some other disease will apply equally well to the late stage patient who would menace the health and wage earning power of a household.

The carrying out of these measures in all general hospitals would increase the knowledge of the proper mode of life for tuberculosis, would increase the general prophylactic technic of all in the wards, and would bring about a more reasonable attitude toward tuberculosis in all classes of society.

In the general hospital in which the writer works this view was accepted by the authorities. Barnes Hospital, the medical unit of Washington University, was built with plenty of room in wards, rooms, and corridors, chiefly for teaching purposes, and with abundant balcony and roof space. Tuberculous patients are not urged to come in, but when they do, they are put on sanatorium methods. Some, that seem to lend themselves to the purpose, are treated for fairly long periods, at least six weeks or two months. Most of them remain only long enough to fix their condition accurately, and they are then passed on to other institutions most appropriate for them, or referred to physicians willing to look after them in their homes. In this the social service department takes an important part. Some patients are sent to the City Tuberculosis Sanatorium, where they get better care in all respects than one might infer from the title, for it is in the country, with good air and water, excellent food supply and fairly adequate medical and nursing facilities. Some are sent to private sanatoria; others to a Night and Day Camp in the city, or to distant States with a view to long or permanent residence. During their residence in the hospital the patients live chiefly out of doors, and though they are separated in most cases from other outdoor patients, this is not always possible. Every effort is made to render least harmful the sputum and to cultivate the habits necessary to lessen infection in the patient as well as others. Sterilization of clothing, utensils, and effects is comparatively simple. The health of physicians, nurses, and others is watched and there seems to be a general increase of prophylactic habit, without undue fear.

OBSERVATIONS ON THE TEACHING OF TUBERCULOSIS

By William S. Thayer, M.D.

Baltimore

No infection brings before the clinician so many and so varied pictures as does tuberculosis. There are few conditions in which the early recognition of the process is so important. There are not many maladies in which it may so definitely be given to the clinician to save the life of his patient.

The subject of intensive study for decades, considerable advances have been made in diagnosis and in therapy. The establishment of sanatoria by municipal, State, and private agencies, the development of special dispensaries for tuberculosis, with their cooperating forces of district nurses, the general education of the public through the agency of local, State and national societies have done much to encourage the earlier recognition of the disease, and to facilitate better and more intelligent treatment. This progress has, however, brought in its train certain changes in hospital, in practice and in schools of medicine which have not always been for the advantage of public or hospital or student. More and more tuberculosis has become to be regarded by the public as a disease apart, to be treated by special physicians in special hospitals. From the general and private departments of our hospitals pulmonary tuberculosis is generally excluded. Special out-patient departments for tuberculosis have been started in some hospitals, but wards for the treatment of pulmonary tuberculosis are very rare. And the public is coming to feel that when a man attains eminence as a student of tuberculosis, he has become a specialist in the strictest sense of the word. This has gone on to such an extent that it is dangerous for a clinician to allow himself to become too closely affiliated with a department for the treatment of tuberculosis, unless he is prepared to lose much of his general practice. In some ways the public suffers from these conditions.

The course of chronic pulmonary tuberculosis which, as we all know, may be compatible with years of useful life, is characterized by all manner of intercurrent complications, by exacerbations dependent upon secondary infections of the most varied nature which ramify into every region of medicine. These exacerbations and intercurrent infections bring before the clinician many interesting and difficult diagnostic and therapeutical problems on the proper solution of which the life or efficiency of the patient often hangs. It is a hardship to the public that such patients cannot, as a rule, be admitted to general hospitals. And it is painfully true that there are few hospitals to which they can be admitted at all,

and fewer of these which afford opportunities for proper study and investigation by thoroughly trained men. There is no field in which the general hospital can do a greater or more valuable work than in the temporary care of patients with chronic pulmonary tuberculosis.

For the student of medicine these tendencies have their advantages and their disadvantages. Where tuberculosis dispensaries have arisen in connection with teaching hospitals, exceptional advantages may be offered for the teaching of physical diagnosis. But, on the other hand, the exclusion of pulmonary tuberculosis from the general wards of the ordinary hospital, takes from student and interne (and the interne is now essentially a fifth year student) a precious opportunity for the study of the course of a disease with which it will be vital for them to be familiar in their practice. Sanatoria for the treatment of early pulmonary tuberculosis are unquestionably of great value, and hospitals for the treatment of chronic and more advanced cases are necessary, but in order that, in such hospitals, the patients should have the best treatment and the students the best opportunity for study, it is desirable that these institutions should be departments of, or closely affiliated with, general hospitals.

While in tuberculosis, as in any other malady, there will always be men, who, as a result of special opportunities and experience, come to be regarded — and justly regarded — as authorities, it is highly undesirable that pulmonary tuberculosis should become a disease treated wholly in special hospitals by men apart from the general profession. The problems of chronic pulmonary tuberculosis are problems which affect all branches of medical and surgical practise, and the too general segregation or removal of patients from active general clinics will be of advantage neither to patient, nor student, nor profession. An interesting analogy may be drawn between the conditions which are arising with regard to pulmonary tuberculosis and those which have existed, and still exist with relation to mental disease, the treatment and study of which has for years been almost wholly removed from the general medical clinic — and not to the advantage of patient or medical science.

This should not occur with pulmonary tuberculosis.

The amount of instruction in pulmonary tuberculosis which is now offered varies greatly in different schools of medicine. Almost everywhere in the instruction in physical diagnosis instances of pulmonary tuberculosis are brought before the students. In some schools in which there are special out-patient departments for tuberculosis, good courses of instruction are given in the diagnosis of the early stages of the disease, and to a varying extent, on the principles of the treatment of tuberculosis. In a few favored institutions which control wards, or are affiliated with hospitals for the treatment of pulmonary tuberculosis, a real opportunity is given for the study of the disease and its complications. But in the great majority of our schools to-day the instruction of the student in tuberculosis is, to say the least, rather fragmentary. In few institutions does the fourth year student in his ward service, if he have

such, or the interne in connection with his year's hospital experience, have an opportunity for the study of the course and complications of pulmonary tuberculosis.

This is not as it should be. What should we try to do?

(1) The establishment of wards for the treatment of tuberculosis in all teaching hospitals is the first requisite for proper instruction in the care of the disease. Every general hospital should have a ward or wards for the temporary treatment of pulmonary tuberculosis.

This would be of great advantage to the public and to the patient. For such a ward will offer to many patients the opportunity to be tided over those emergencies which, without the advantage of enlightened care, are often immediately dangerous to life. Such wards need not become homes for the incurable; and they may serve a very good purpose in the temporary care of the chronic tuberculous. Such wards would be of immense advantage to the student, because the presence of these patients offers to him and to the Staff opportunities for studying a large number of conditions and of meeting many problems and emergencies against which they are sure to be called upon to contend in their subsequent practice.

(2) The teaching of tuberculosis should be taken up systematically.

In the older text-books the subject of tuberculosis was rarely treated as a whole. The different manifestations of the disease were considered according to the location of the process among the diseases of the meninges, the diseases of the lungs, the diseases of the genito-urinary tract, the diseases of the peritoneum, and so forth as the case might be. There was little or no consideration of tuberculosis as an infectious process. If, however, we turn to the better modern text-books we shall find that here tuberculosis is considered separately as an infectious disease, just as we consider typhoid fever or pneumonia or diphtheria. When, now, we come to consider the manner in which the study of tuberculosis is approached in our schools of medicine we shall find that the older method still prevails — that there is little or no consideration of tuberculosis as an entity.

Besides training in the physical diagnosis of early tuberculosis the student of medicine should be offered instruction in the common general phenomena of tuberculous processes, in the anatomical and clinical characteristics of the infection, in the general problems of immunity, in the conditions which influence susceptibility, in the theory and practice of diagnostic tests, in the interpretation of fluoroscopic and radiographic observations. This should be done in demonstrative clinics and in practice in small groups in the ward. Further opportunities should be given for ward work during the fourth year and during interne service for observation of the course of pulmonary tuberculosis in the hospital. Thus special problems of treatment may be considered and resolved. In short we should study tuberculosis not only in its special manifestations, but as an individual infectious process, as we study typhoid fever or pneumonia or diphtheria.

In summary then the two great prerequisites for the proper teaching of tuberculosis would seem to be:

(1) Provision for the care of a certain number of cases of pulmonary tuberculosis in our general hospitals.

(2) The establishment in our schools of systematic instruction in tuberculosis as an infectious process, as it is now taken up in the better text-books, and not merely as a disease of different systems as it may chance to appear. Only thus can we expect the student properly to be equipped to meet the emergencies of practice, or to benefit by the special advantages which are to be offered by such schools as that which the President of this Association, who is the sort of specialist in tuberculosis from whom we may all learn, is soon to head.

DISCUSSION ON PAPERS BY DR. McCRAE, DR. DOCK, AND DR. THAYER

Dr. William Charles White, Pittsburgh: The significant fault in medical education to-day and for the past two decades is our failure to present to the students disease entities. Tuberculosis is typical and perhaps the most glaring example of this inadequacy of our present system. The fault has grown as a natural sequence of the divergence of our profession into specialties and the segregation of our diseases in separate hospitals.

Taking tuberculosis as a type,— medical education begins with the study of anatomy, physiology, chemistry, and physics. While still busy with these foundations of knowledge of the human body, the student takes up again his study of biology with the field of bacteriology and gains a meager knowledge of the tubercle bacillus varieties as members of the acid fast group of organisms and something of their pathogenic value. This forms a fairly concrete presentation. From there the student enters his studies of pathology and sees numerous gross and microscopic pictures of the miliary tubercle and its component parts in different tissues. This also is a partially concrete representation and often closely linked with the bacteriological study, preceding or accompanying it. From this time on, however, the student is passed along to the varying special types of clinical teachers,— the dermatologist, the oculist, the neurologist, the surgeons of various regions, the clinicians of many varieties, the sanitarian, and so on and he never again hears of tuberculosis as a disease entity, but only as a special type of sickness in each clinical department.

Most of the clinicians have their minds fixed on therapy and with a disease so easy of diagnosis as tuberculosis, the teaching is largely devoted to various curative methods. In some schools, the teaching is as various as the teachers and no attempt is made to correlate the different versions of many men, or to present the disease as a single malady modified in its expression and physical signs by its location in different tissues and organs.

Again, owing to public health activities by organizations separate from the medical teaching group, tuberculosis has been segregated in special

institutions far away from the teaching institutions and so 90 per cent. of the disease, that is, tuberculosis of the lungs, is not available for study by doctors and nurses in the teaching hospitals. This has resulted in the inevitable presentation to students in the clinic of only the rarer manifestations of the disease which the physician only rarely, if ever, meets and the neglect of the phases which he meets almost every day after he enters practice.

Such criticisms are just as applicable to cancer, infant diseases, various infectious diseases, syphilis, and gonorrhœa, in fact it often seems to me in visiting clinics that the chief aim of the clinic is the presentation of a rarity rather than a careful study of the everyday types of disease which the practitioner has to deal with.

What are the possible solutions of this complex situation? I can picture one which perhaps many of us may see,— a wholly new type of medical teaching. In the first place, a rearrangement of our schedules on the basis of the importance of a disease as a menace to the human family, and an apportionment of time on this foundation. Then tuberculosis will be studied for days at a time and nothing but tuberculosis in all its forms presented. In the pit of the amphitheater will appear the anatomist, the chemist, the physiologist, the bacteriologist, the pathologist, and the clinician. The exhibits will include tuberculosis in all its clinical forms with their pathological duplicates, the unsolved problems of the disease, its sanitary aspects, its relation to housing, poverty, and wages, and then the whole problem will be summed up by the chief of the clinic and the student will carry away for the first time in history some conception of a disease entity in his mind for all time. The same will be done for each great human invader,— the pneumococcus, the spirocheta pallida, the gonococcus, cancer, and other pathogenic organisms.

In this way, the student will change his present conception and begin to think in terms of the tubercle bacillus or other organisms as a specific causative agent of disease in the animal body, modified in its expression by the tissue in which it grows.

This will bring back automatically the discarded maladies into the great teaching hospitals in separate pavilions or floors of one institution and stop the present tendency to one-sided hospitals.

Teacher and student will face the fact that a given organism holds many manifestations in its power, determined by its localization; all manifestations, however, of each organism yielding to a single treatment when a specific cure is known, but susceptible only to certain physiological, physical, chemical, and symptomatic care when no specific cure has yet been found.

From this regeneration of the schedule on the basis of the importance of the malady to the human family will soon appear a supply for the demand by governmental agencies of trained men and women for the protection of the populace in the great problems of public health and the production of that elusive individual,— the doctor with a social sense.

Dr. H. R. M. Landis, Philadelphia: Some six or eight months ago the

Board of Directors of the Association appointed a Committee for the purpose of investigating the methods that were being used in the teaching of tuberculosis in the various medical schools. An inquiry was sent out to all the leading schools of the country and answers were received from something like forty. An analysis of the courses that were being given in these various schools disclosed the fact that out of the forty that replied, there were only seven in which the course in tuberculosis could be considered at all adequate. It was the function of this Committee to determine as to what was the best method by which the disease should be presented to students; whether it should be presented, for instance, as a specialty, or simply as a part of the great problem of clinical medicine. I personally have always been opposed to the teaching of tuberculosis to the medical students as a specialty.

I think tuberculosis should be taught in the relation that it bears to disease in general; and, if the student has had a general training, he desires to go into this special field — which I think is even then too restricted and that it should always include disease of the chest of all sorts — then he is at liberty to do so. I do not know of anything that is so conducive to narrowness and which tends to make a man force a diagnosis as the question of considering a disease from one standpoint only. Personally, I have been so situated that practically during my entire medical career I have been associated almost entirely with institutions devoted to tuberculosis. I have made it a point during all these years to go through the wards of the general hospitals at frequent intervals with those of friends, who have medical services, for the sake of seeing disease in other aspects, and I know of nothing that is more beneficial. I do not believe that any one who confines himself exclusively to a limited phase of medicine dealing with special problems does so without getting a very narrow conception of the problems with which he has to deal.

On the other hand, there seems to be no reason for neglecting the study of this disease as most of the schools do. In the first place as the Chairman pointed out, if you take away from clinical medicine all that you can learn in the way of physical signs and the art of physical diagnosis from tuberculosis, you will have very little left to be learned from other diseases, especially those of the lungs; and over and above that, and probably more important still, is the relation which this disease bears to the general problem of what is commonly referred to as Public Health.

It has been our policy at the Phipps Institute in so far as any special social problems were concerned to include the underlying causes which produce the disease. There is practically no limit to what you may do because bad housing, the food problem, the question of the influence of various industries upon health — all of these things which pertain to the health of the general community concern the tuberculosis problem as well. There is an enormous opportunity for education in this field, one that is becoming of more and more importance, and one that inevitably must be taken up by the medical schools as a part of their curriculum. Men must be trained to carry on this work which is becoming more and more im-

portant, and for which there is more and more demand. I would like to endorse everything that both the speakers have said in the way of bringing tuberculosis back into the field of general clinical medicine. I think it is a grave mistake to teach the student this disease in the light of the specialty, because, after all, it is not a specialty, and any one who attempts to study it from the standpoint of a specialty is inevitably going to get a very narrow and cramped view of the whole situation.

Dr. Charles L. Minor, Asheville: In seeing the diagnoses made by the run of general practitioners, it seems to me one of the troubles is in the physical diagnostic side of this question. The teaching of physical diagnosis in our schools is I am very sure generally inadequate. We know perfectly well how much care and attention is necessary in making a careful and skilful early diagnosis of pulmonary tuberculosis, and my impression is that the small town practitioner, the country practitioner, has gotten in his medical school days very sketchy and very indefinite instruction in careful physical diagnosis.

Take the all important question of a proper technique of percussion which we know every doctor should master. We know how very few are taught to master it. Take it in the question of the careful auscultation of the breath sounds, and the recognition of those different health changes which, not only in the diagnosis of early tuberculosis, but in many other conditions, are so necessary to recognize, classify and interpret.

A large number of the men come out of school entirely unfamiliar with these changes, or come out expecting, as regards the early diagnosis of tuberculosis, to find bronchial breathing, large moist râles, dulness, and things like that. Now, if you are to expect the general man to make early diagnoses — and the general man must do it if it is to be done — he must be taught good physical diagnosis. If the general man is to do satisfactory work it has to be founded on good diagnosis, and you all in the schools have got to see that he is taught more thoroughly, so that when he leaves the school, he is capable of taking a careful history and of making a good physical examination.

Dr. H. M. Bracken, St. Paul: I am greatly pleased with the papers and discussion this morning. If there is any one who needs the help of the general practitioner in the handling of this problem, it is the Health Officer. If the Health Officer is to have help from the general practitioner, it must be secured through instruction given medical students as to how to take care of tuberculosis as a communicable disease. Tuberculosis should not be considered as a side issue, or a special disease.

To illustrate, I am going to bring out a condition that was brought to my attention just before I left home: A general practitioner had failed to make the diagnosis of tuberculosis in a case that should have been easily recognized. Presumably his failure was due to the fact that he had not been taught properly.

This patient was sent to a general hospital which was, by the way, a teaching hospital. The diagnosis of tuberculosis was made. The patient

was taken out of the general hospital where he ought to have been kept both for his own benefit and for teaching purposes, and was placed, by people who could not afford it, into a pay institution where he did not belong. Then the case was referred to the Health Department. One city said it "did not own the man"; another city said the same thing, and the unfortunate patient was certainly in trouble.

One of the speakers, in discussing the paper, spoke of Public Health as having accepted tuberculosis in a way. No; Public Health does not know "where it is at." The problem is not referred to the Public Health worker until the conditions are such that the so-called specialist in tuberculosis does not know what to do.

Dr. Frederick T. Lord, Boston: There is one way, it seems to me, in which this problem can be approached from the point of view of the patient and the student and that is, that general hospitals or adequately equipped special hospitals, situated in large centers of population, can fill an immediate and urgent need by the establishment of observation wards for the diagnosis of suspected pulmonary tuberculosis. Hospitals within medical centers not infrequently have better facilities for establishing the diagnosis in obscure pulmonary conditions than are provided in sanatoria, more favorably located for treatment in less crowded communities, and it seems to me that the time has come when such a provision may well be made. This would assist in the education of the student in tuberculosis, and he in turn would be of assistance in accumulating much of the data on which the diagnosis must be based. The establishment of an early diagnosis has obvious advantages to the patient, and the tuberculous nature of the trouble once established he had best be sent to an institution more suitably situated and equipped for the treatment of tuberculosis than the general hospital.

In Boston we are attempting in part to fill this need of affording facilities for the early diagnosis of obscure pulmonary conditions to patients and at the same time providing easily accessible patients with tuberculosis for students by modifying the plan on which the Channing Home is conducted. This institution, previously devoted to the care of patients in the more advanced stages of tuberculosis, is near the Harvard Medical School and can now admit a limited number of pulmonary cases for investigation and later distribution to the sanatoria for tuberculosis or elsewhere as may seem desirable.

Dr. W. J. Durel, New Orleans: I think the keynote has been struck now in the great crusade against tuberculosis. In the Tulane Graduate School of Medicine, the teaching of tuberculosis has been extensively undertaken during the past five years. Though it has been a great problem for years — the other medical schools have not yet made special provisions for the teaching of this branch of medicine.

We certainly have been deficient in teaching pulmonary diseases, especially tuberculosis — in the past, and this can be attributed to a lack of facilities in our Charity Hospital of New Orleans.

We are trying gradually to bridge this over, and this year we have

succeeded in separating the tuberculous patients from the general wards.

We have now an isolated and separate department for tuberculosis patients, and we expect to do better work with our patients, and with our students.

Evidently, from the trend of the discussion, there has been a great neglect in the teaching of tuberculosis to undergraduates. This also must be the condition in New Orleans, for the internes coming to the tuberculosis service have this manifold idea: "Why! It is useless to take charge of the tuberculosis ward. What's the use of wasting time in tuberculosis wards?" As an example, I have not seen my interne for the past month.

Still, after graduation, we see these same deficient internes blundering day after day in the diagnosis, etc., of tuberculosis.

As for the acceptation of making a specialty of tuberculosis, I don't think that concerns the medical schools at all. If a man has enough work in this line to justify him to limit his entire time to tuberculosis, I believe such should be encouraged. But there is one thing that concerns the medical schools, and that we should do: The men who are going to teach tuberculosis should be better prepared in this branch than the average teacher of general medicine, to-day. Let us teach our teachers first,—What is tuberculosis? What are the proper measures of Prevention, Diagnosis, and Treatment? To those who wish to specialize in tuberculosis, the specialist teacher becomes indispensable. The general practitioner can teach tuberculosis provided he is proficient, and has acquired the necessary clinical and practical experience. Now the question is this: we certainly have been going in this great crusade of tuberculosis with manifold publications and public speeches, but the keynote to success, in my opinion, is, "Educate the medical man, first." He is the one to control the welfare of the tuberculous victim, and not the layman. If he does not make an early diagnosis, where are we? Now, gentlemen, I believe that this is the grandest day in the crusade of tuberculosis, and I feel that we owe a debt of gratitude to Dr. Thayer, and the others who have spoken on this important subject this morning.

Dr. John Ritter, Chicago: It has been my good fortune for more than eight years to have taught physical diagnosis and now for a number of years I am teaching students the principle underlying the examination of patients suffering from tuberculosis. When first I began teaching tuberculosis, my classes were very small and limited. The average medical student a number of years back, was really afraid to come into the classroom to receive such instructions, particularly when many active tuberculous patients were present. He was really afraid of tuberculosis. This is all changed now, for the medical student of the present time sees the great need of sufficient training and I find now a regular attendance on every tuberculosis clinic day. The present day medical student has learned by observation at clinics that 70 per cent. of all cases which he sees at the different medical clinics, are tuberculous. This percentage may be a little high, but the frequency of seeing tuber-

culosis in one form or another has so impressed him with this importance, that unless he is able to make a thorough examination, especially of the chest, he will not be able to master the problem. It is my firm belief that most can be accomplished in the interest of the future physician if the teaching of tuberculosis be made a separate branch, or at least a distinct division in medicine, in every medical school.

Dr. H. K. Dunham, Cincinnati: It is with a great deal of hesitation that I attempt to speak after the great men, but this is a big subject, and as every one in tuberculosis work has echoed, this is practically an epoch-making day when the great eastern schools come forward to take charge and present to us a clear way of getting knowledge to our students. Fashions go in surgery as well as they do in women's dress, and it is a very difficult job, even just a few miles west of the Alleghenies, to get our medical schools to make an innovation if it has not been preceded by those of the Atlantic Coast.

This subject will be an easy matter when Dr. Thayer stands and presents it, when Hopkins takes the lead and says how it should be; then it will be no trouble further to present this to our school in Cincinnati.

Another thing that was brought up in Dr. Thayer's address was the sacrifice that is made in going into this field of tuberculosis. No young man can be advised to go into the field to do tuberculosis work unless he knows the financial sacrifice that he is making. If he drifts into it carelessly, that is his fault,— if he goes into it with his eyes open, knows what it costs, knows what he loses, knows the difference between taking up the specialty of tuberculosis — and it has to be more or less of a specialty — on one hand and G. U. work on the other. Tuberculosis never has, it never will pay well.

Gentlemen, when you are here devoting your time to this work, you must either do it because you know what you are doing or because you are drifting. Now, this is no time to drift. It is a tremendous problem and it rests with the student. You all know how hard it was to get you as a student to go into the post-mortem room when you knew that old stiff died of tuberculosis, and yet, we know almost nothing about the pathology of tuberculosis of the lungs to-day. It has to be gone over. Our physical diagnosis is not finished; it is talked about by our specialists as though it were. The very charts upon which we make our marks will be gone over, and the very color of them will be changed many times before they are right. But it can only be done by brains; it can only be done when the big men at the head of medicine, not the poor fellow who drifted into tuberculosis, but the big minds are put on this subject, because the subject is worthy of it. That is the big step — the fact that they realize that it requires a big mind.

Just one word, then. Everybody likes to speak of his own. I would just like to say that we have in Cincinnati one method, and practically only one method, of teaching physical diagnosis. Each student is given several cases of cavity or several cases of pleural effusion, or several cases of early tuberculosis. He is not told what he should find, is not

told to find out what the books say, but it is his business to chart and find out the physical signs in that chest for himself. That is the only thing we do.

Dr. S. A. Knopf, New York: As one having had quite a little experience with teaching tuberculosis to under-graduates and post-graduates, I wish to emphasize one point in connection with the difficulties which must be overcome if we wish to make clinical teaching of tuberculosis effective and which our distinguished orators from Baltimore and Philadelphia have entirely forgotten. I refer to the phthisiophobia quite frequently encountered among medical students, internes and young physicians. They are afraid to go into the wards where there are tuberculous patients. In my own service at the Riverside Hospital I have the greatest difficulty in getting internes. These young gentlemen are all very enthusiastic about learning all that is to be learned concerning diphtheria, scarlet fever, measles, and any other acute infectious diseases, but they draw the line when it comes to learning something about tuberculosis by actual contact with patients. And if some of these internes do consent to do tuberculosis work, they imagine that three months is about all they need to master tuberculosis science. Those of us who have been in the work for years know how many times three months it takes to realize how little we know of this most difficult phase of internal medicine.

I do hope that the suggestions made by one of the previous speakers concerning obligatory tuberculosis service will be carried out in every medical school of the country. No tuberculous patient should be put into a ward where there are patients afflicted with other diseases; but on the other hand, I think it quite feasible, practical and without the least danger to patients, nurses, physicians, or employees to have separate tuberculosis wards attached to general hospitals. These wards, special tuberculosis hospitals, or nearby sanatoria should be at the disposal of the medical schools so that there is ample opportunity for the future general practitioner to learn what is known of the modern methods of diagnosis and treatment of tuberculosis.

We have heard here to-day, and those of us engaged in tuberculosis work hear and see a good deal, about the mistakes the general practitioners are supposed to have made. In discovering and discussing these supposed shortcomings, due to lack of early instruction, let us also not forget but confess in all humility that we, in spite of our more extensive training, do make mistakes ourselves, and perhaps much more frequently than we think.

I endorse most heartily the suggestions made this morning that we, the so-called tuberculosis specialists, should not forget that there are other diseases and that our interest in general medicine should be kept up because of the close interrelation of tuberculosis with many of these diseases. I think our distinguished chairman is right when he says, "Don't let us divorce general medicine from tuberculosis, nor tuberculosis from general medicine." To this I would wish to add what our

great Osler put so tersely and pertinently, namely that not the tuberculous specialist but "the general practitioner is the man behind the gun in the combat of tuberculosis."

Dr. E. O. Otis, Boston: I quite agree with what Dr. Ritter has just said with regard to the teaching of tuberculosis, namely, that this subject should constitute a separate department or unit under the general division of internal medicine. In my experience in teaching tuberculosis for many years I have followed this plan and have found it eminently satisfactory. Besides the head of such a unit there should be a sufficient number of well-trained assistants so that the students can receive intensive training in small sections. The sources from which clinical material must be drawn are first, and in my opinion the most important, the tuberculosis dispensary, either a separate institution or a separate department in a general dispensary, and second, the tuberculosis hospital, or, as has been proposed, a tuberculosis department or ward in a general hospital, although it seems to me doubtful, such is the attitude of general hospitals with regard to receiving cases of tuberculosis, if this latter plan is likely soon to be attained, as obviously desirable as it seems. There seems to be no good reason why the custom of the Continental hospitals should not be followed in this respect; however, in nearly all large municipalities there are near at hand tuberculosis hospitals available for teaching purposes, and likewise in some instances municipal sanatoria not far away, as, for example in Chicago and Seattle, which could also be utilized especially for illustrating and teaching the *treatment* of the disease as well as its other phases.

Furthermore, I believe that the teaching of tuberculosis should be done by the specialist. The subject has now become so large and important and so much is demanded of the physician as to its diagnosis and treatment that the general internist has not the time or opportunity to acquire such detailed knowledge which now seems to be necessary at the present day, to teach the whole subject of tuberculosis. This is a day of specialist, and the public more than the physicians have made it so. The public recognizes the specialist in tuberculosis and it is to him they turn if the disease is suspected rather than to the general internist. True it may be that the tuberculosis specialist is no more able in that department than is the general internist, but he is supposed to be, and ought to be more experienced in, and familiar with, all the details of the subject, therefore, granting that the specialist in tuberculosis is truly such — a well trained and experienced man — he, in my opinion, should be the teacher in that division of general medicine which is devoted to the study of tuberculosis.

Dr. Charles M. Montgomery, Philadelphia: We have heard a good deal about the education of the medical student, and of course we all endorse thoroughly everything that has been said about that. That is of primary importance and it is the great hope for the future. At the same time there are a great many practitioners to-day who are willing and anxious to learn about tuberculosis — men who have been out for five and ten years — and we have seen in many cases a good deal of progress made.

Some of them have had the chance of going to tuberculosis dispensaries or hospitals, and have picked up a good deal.

Throughout this country we have something like five hundred tuberculosis dispensaries, and the physicians associated with them are largely general practitioners. We have also the State and county medical societies throughout the country, and they are very easily interested in the subject of tuberculosis by proper programs and proper sources of stimuli which are available. It seems to me if this Association could coordinate all those agencies in the proper way, a great deal more interest could be stirred up in them, and through them more interest could be extended to the general practitioner, and a great deal of good accomplished, even with a man who has already been out a good many years. I have known a good many men doing general work, and who have had an opportunity to work in special dispensaries, and the uniform verdict is that they have gained a great deal by such work, and would not give up the experience for anything.

Dr. C. E. Edson, Denver: While we are working out the problem of how to give instruction in the recognition and care of tuberculosis, and how better to correlate this care with the general practise of medicine, I think there is one point in which we can establish at once an improvement in the situation. We must remember that a patient with tuberculosis is suffering from a chronic disease, subject to many incidental infections and accidents. He is also liable to have any intercurrent ailment, unconnected with his tuberculosis. There is little provision in our hospitals for the care of these incidental conditions. The general hospitals of most of our cities, particularly throughout the West, will not admit a patient suffering from tuberculosis, although the illness for which we ask his admission be temporary, and not of a tuberculous character. For this attitude of our hospitals the trustees, and, back of the trustees, the medical staff, is largely responsible. I think we are maintaining in this an illogical position. We tell our patients, we tell the public, that tuberculosis is dangerous to the community,—not from the patient directly, but from his sputum;—that if his sputum is properly and carefully cared for, that if he maintains a proper regard for his surroundings, the patient is not a source of danger. Yet in a hospital, where we have trained physicians, trained nurses, and every convenience for the safe and easy control over this expectoration, we refuse him admission for a temporary illness of a few weeks' duration. We are starting out to solve a large problem, and neglecting the close-at-hand easy solution of one detail.

There is probably no man in this room who is not connected with some hospital, or has not some influence over some of the smaller hospitals in the country where this difficulty is a common occurrence.

It is not necessary to establish a tuberculosis ward, or a special department of tuberculosis, in these smaller hospitals; but we should have that degree of logical intelligence brought home to our hospital staffs, that they will be willing to admit a patient suffering from tuberculosis pending temporary emergency, or an intercurrent ailment not tuberculous.

Dr. Alfred Meyer, New York: I just want to detain you a minute or two. I think on the whole that there is a general agreement on the need of a reform in hospital management in the teaching of the subject of tuberculosis to both the specialist and the general practitioner. I want to draw attention to one thing in the City of New York which perhaps sets an example in many things, and sets the pace for the rest of the country,— I want to draw attention to the fact that one of the principal medical teaching bodies in New York is connected with a hospital refusing cases of tuberculosis, and I think New York City would not be a bad town to make the beginning of reform.

I am not going to mention names. Perhaps some of you will know what institution I have in mind. In this connection I say a notable exception is Mount Sinai Hospital. It has two separate wards, one for four women and one for four men, exclusively devoted to the purpose of caring for cases of pulmonary tuberculosis. They were established with the object of making them a clearing house for the decision of the question of prognosis. In other words, to determine whether those patients may reasonably be cured, or were presumably curable, and therefore to be sent to a sanatorium, or on the other hand as more probably advanced cases and incurable, or at least incurable in the industrial sense, and therefore to be sent to hospitals for advanced cases. The tendency has been in twelve or thirteen years toward the admission, unfortunately, of more advanced cases than the type for which the ward was established, so that in following the suggestions made to-day, there has been a tendency for a blocking of the service, and consequently limiting the benefit to a rather small number of people, smaller than was expected. I think that Dr. Otis, of Boston, is right — I often agree with my New England friends; they led the way in the State sanatorium movement as they did in the movement for the abolition of slavery, civil service reform, and other great causes, and I always say, " If I am born again, I want to be born in Massachusetts."

We are responsible, I think, for some of the phthisiophobia that has permeated the public and also the ranks of medical students. It seems to me that if a medical student would take the point of view that he is afraid to go in and examine a case of tuberculosis, I should say if that were so I should exclude him from my classes. I am not speaking from theory only. I had that experience with trained nurses who didn't want to go to scarlet fever cases in New York City. I said, " You are not fit to be trained nurses if you don't want to do that. The physician has to attend them and if he refuses he is not fit to go into medicine. We need your help in those cases, and if you want to exclude that from your training — if he is not fit to go into medicine because he does that, you also are not fit to go into nursing because you want to do that."

I believe that the tuberculosis dispensaries are a partial remedy for the defective teaching, but not so good a remedy as the use of material in a separate ward. We know what the floating dispensary population is, and how uncertain their attendance, hence how difficult it would be for the student examining the patient to-day, to see him six weeks later and to

visualize any contrast in signs between the first and second examination.

Therefore, for teaching purposes, really the separate ward would be the best method. I don't know how many speakers will succeed me, so I will make this suggestion. We ought to have, it seems to me, the backing of this Association in the form of some resolution to be brought in the usual legal way before the Board of Directors and then perhaps to be presented to the general meeting, some type of resolution to which those of us who are teaching could point as an endorsement by this Association for the establishment of some appropriate procedure. I am in favor of the separate wards in the general hospital, but if they don't want to accept that, well and good, then for some improvement along that line so that we could offer the endorsement of this Association to the boards of directors where we want to enlarge the work. If we sit at this annual meeting without any such actual practical procedure, I think our talk would be wasted. I wish the Chairman would appoint a committee to draw up a suitable resolution.

The Chairman: I would suggest, perhaps, Dr. Meyer, that you might draw up and submit a little later in the morning, such a resolution.

Dr. Meyer: I should rather leave it to a committee to study it out quietly, and simply embody the idea in some form which would meet the endorsement of the general meeting. Personally I think most of the speakers have preferred separate wards of small size, if you choose, in the general hospital to be devoted to this matter.

Dr. Thayer: I can only emphasize the remarks made by the Chairman and Dr. Minor as to the importance of pulmonary tuberculosis as the malady in which the intricacies of physical diagnosis of the lungs can best be learned. One of the things that, as the years go by, I have missed particularly in hospitals is the necropsies on patients with advanced tuberculosis. How is a man going to learn to make out the rare complications of pneumonia, the abscesses, the interlobar empyemata and the other unusual changes in the lungs unless he has studied the frequent conditions more or less approaching these which one meets with so often in chronic pulmonary tuberculosis. And one can learn only by studying the patient during life and seeing the anatomical conditions after death as is possible if we have in our wards patients with chronic tuberculosis.

If there be a ward to which tuberculous patients are admitted during exacerbations, a certain number will come to necropsy, and in some of these cases the student will be able to control that which he has suspected during life. The study is of greatest importance in the teaching of physical diagnosis of the chest or lungs.

With regard to Dr. Otis's remarks, I fancy that after all there is no very great difference between our feelings in the matter. In any general clinic there are men who are interested in, who devote themselves especially to special subjects; and in the teaching of internal medicine the instruction in diseases of the heart, for example, is very apt to be given by that member of the staff who is especially interested

in diseases of the heart. But that does not mean that this is a man who gives all his time to diseases of the heart.

This is true of almost every branch of medicine. The same considerations would, I think, apply to the teaching of tuberculosis in special tuberculosis wards of the hospitals. It is a very good thing that there should exist sanatoria for the special treatment of diseases of the heart, and we send our patients not infrequently to such sanatoria where they are treated by men giving their entire attention to developing the strength of the failing heart muscle; many of the men at such sanatoria do nothing but treat cardiac disease. But the number of those men must of necessity be limited, for in the course of time, their opinion, extremely valuable in that one branch of medicine, becomes less valuable in other general matters.

In the same way with pulmonary tuberculosis, it is well that there should be sanatoria and many of them, under the charge of highly developed specialists, men that we general practitioners would, and always will desire to consult and send patients to. But it seems to me that this does not mean,— and I am sure that Dr. Otis doesn't feel quite so strongly as he seemed to me to put it — that there should not be wards for the treatment or study of chronic tuberculosis in general hospitals, or that all of the instruction in tuberculosis should be given by men who devote their whole time to the care of the tuberculous in sanatoria. To these men we are likely to send our graduates and our students at times, for special, advanced instruction, but I should think that most of the routine instruction would still be given by general physicians, very likely men with a leaning toward this special branch of practice.

It is, it seems to me, very important that hospitals should realize that tuberculosis is not a disease to be banished from the wards without great disadvantage to the public, the profession and the student.

Dr. Meyer: Does the Chair wish to entertain a motion? I would move that a committee of five be appointed to draw up a suitable resolution along the lines of the discussion this morning that might be presented to the Board of Directors.

(Motion was seconded.)

The Chairman: The Chair would suggest that the number on the committee be restricted to three. I feel that every additional member of the committee after three reduces its efficiency. If there is no objection, the Chair will appoint Dr. Meyer, Dr. Otis, and Dr. Bracken on that committee.

The Committee subsequently offered the following resolution:

"WHEREAS, In the past the tendency of general hospitals has been to exclude cases of tuberculosis, and

"WHEREAS, It has been demonstrated in a number of such institutions that this class of cases may be admitted into separate wards without detriment to other patients, and

"WHEREAS, Both for humanitarian reasons and for purposes of instruction, there is a need for a change of policy in this regard, therefore

"Be it Resolved, That the National Association for the Study and Prevention of Tuberculosis commend to the general hospitals through both their medical and lay boards that separate wards, one for each sex, be established for such cases."

The Chairman: You have heard the resolution. As the time is short, I think discussion is unnecessary, unless there be some one who does not agree. If there is any one who does not agree with it, I shall ask them to speak.

A Member: Is the entire Association here, or just one section?

The Chairman: This is a recommendation from the Clinical Section to the general meeting.

Dr. Knopf: There is a Committee on Resolutions to whom this resolution will be referred.

The Chairman: This is to be sent from the Clinical Section to the Resolutions Committee.

A motion prevailed referring the same to the Resolutions Committee.

HEMOPTYSIS AS A SYMPTOM

By Frederick T. Lord, M.D.

Boston

Of the various publications which have dealt with this subject the monographs by John Ware * are especially noteworthy. Of 329 cases of hemoptysis observed by Ware the bleeding was ascribed to tuberculosis in 190 and 62 (18 per cent.) recovered without subsequent symptoms to suggest pulmonary tuberculosis. It appears from Stricker's investigation of 900 young and strong soldiers with hemoptysis in the Prussian army that of 480 in whom the hemorrhage occurred without recognizable cause of after a "cold" 417 or 86 per cent. were certainly or probably tuberculous, of 213 in whom the bleeding followed the ordinary exertion of military exercise 176 or 82 per cent. were ascribed to tuberculosis and of 118 cases in which this symptom came on after more severe exertion (as in the gymnasium, in riding or in swimming) 76 or 64 per cent. were thought to be tuberculous.

In all large series of clinical cases of hemoptysis in which an inquiry is made concerning the proportion to be ascribed to tuberculosis the question of the relation of a certain number to this disease must remain unanswered without an appeal to more definite data than can be accumulated on patients during life. The frequency with which hemoptysis is not followed by outspoken tuberculosis has made the interpretation of the symptom difficult and has led to a feeling of uncertainty as to the cause especially in those cases in which it occurs in patients with good family history, in apparent health and without attendant manifestations of tuberculosis. Although it is apparent from the well known tendency of tuberculosis to undergo spontaneous arrest that apparent recovery as in Ware's 62 cases is not an assurance against this disease, yet the question of the significance of hemoptysis cannot be answered without further evidence than this. Stricker's cases in which the hemoptysis appeared to be due to certain or probable tuberculosis in diminishing percentage as the physical exertion increased suggest the possibility that exertion itself may be a sufficient cause of the bleeding.

In the attempt to reach a more definite conclusion as to the meaning of this symptom 549 clinical cases of hemoptysis have been reviewed and included in this number are those instances which have occurred at the Massachusetts General Hospital, at the Channing Home and in my private records. In addition to this group of clinical cases 307 instances

* (On Hemoptysis as a Symptom, from the publications of the Massachusetts Medical Society, Boston, 1860), and by Stricker (Ueber Lungenblutung in der Armee, Festschr. z. 100 jährigen Stiftungsfeier d. med.-chir. Friedrich Wilhelm Inst., Berlin, 1895).

of hemoptysis with autopsy have been found in the records of the Massachusetts General Hospital. A useful division may be made between those cases in which the bleeding comes out of a clear sky or when cough and scanty expectoration alone cloud it and those in which the hemoptysis is but one of the symptoms of pulmonary or other disease. It is of interest also to note the probable frequency of the various causes and the influence of hemoptysis on the course of pulmonary tuberculosis. These matters are discussed under the headings which follow:

HEMOPTYSIS OUT OF A CLEAR SKY

Excluding from consideration all cases in which the diagnosis has not been established, there are thirty instances of hemoptysis in this group. In these the hemoptysis was an initial event, unpreceded or followed by pulmonary or other symptoms or accompanied only by cough with or without scanty expectoration. In this number are included twenty clinical cases with sputum positive for tubercle bacilli at the time of the bleeding or later in their course. Other clinical cases, of which there are a considerable number with hemoptysis out of a clear sky, but in which definite proof of the cause is lacking, are left out of consideration as of undetermined origin. The ten remaining were autopsy cases and nine, of which three may be mentioned in greater detail, showed obsolete, inactive or active pulmonary tuberculosis. Thus with one exception all the proved cases in this group were tuberculous.

The three cases already referred to may be summarized as follows: One was the case of a man of 46 who entered the Massachusetts General Hospital in 1898 with a history of having coughed up a lump of blood as big as an egg twenty-four years before after rowing a race. The hemoptysis was not preceded or followed by pulmonary symptoms. He died in hospital following an operation for cancer of the stomach and at autopsy (274) obsolete tuberculosis of the lungs and bronchial lymph glands was found as the probable explanation of the bleeding. A second instance is that of a woman of 28, who entered in 1896 with the story of having had a hemorrhage two years before while stepping off a car. She began to cough only four weeks before admission and died from a recurrence of the bleeding. At autopsy (XI-204) the lungs showed tuberculosis with cavity formation. A third example is that of a man of 53 who entered in 1915 and stated that twenty years before for a time at intervals of every few months he coughed up a mouthful of blood. Cough did not precede the hemoptysis but slight hacking cough followed for a few weeks only. There were no subsequent symptoms referable to the lung and he died in hospital from perforation of a gastric ulcer. At autopsy (3530) obsolete tuberculosis of the lungs was found.

The single exception to the tuberculous origin of hemoptysis in this group illustrates an uncommon cause. This was the case of a man of 37 who entered the hospital in 1904 with a history of winter cough without expectoration for three years. He had an abundant hemoptysis

three days before entrance and death occurred two days after admission from a recurrence of the hemorrhage. At autopsy (1196) syphilitic ulceration of the trachea and bronchi with rupture of a large branch of the pulmonary artery into the right primary bronchus was found.

Although other causes in rare instances are found in this group none have come under my personal observation. Authentic examples of hemoptysis from the ulceration and rupture of anthracotic or tuberculous glands into the air passages, echinococcus disease of the lung, new growth of the bronchi and infection with Distoma Ringeri (endemic hemoptysis) may be found in the literature.

To judge from these cases it may be stated as a clinical rule, subject only to rare exception, that hemoptysis out of a clear sky or when cough and scanty expectoration alone cloud it is due to pulmonary tuberculosis. The rule seems to hold as well in those cases in which the hemoptysis occurs during a mild acute respiratory infection, after exertion, moderate injury or without any apparent cause. Exertion of itself cannot be regarded as an adequate cause of hemoptysis, but it may lead to bleeding earlier than would otherwise occur in a patient with tuberculosis owing to the added strain on the walls of blood vessels already weakened by disease. Initial hemoptysis, even though the only symptom, without subsequent manifestations of pulmonary disease and the maintenance of full health until life is terminated by some other cause is to be regarded as probably of tuberculous origin. Unless care is exercised in taking the history that all symptoms are included and it is established that the hemoptysis is an uncomplicated event the situation may be wrongly interpreted. Hemoptysis from pulmonary embolism arising in consequence of latent venous thrombosis, for example, is likely to be accompanied by such other symptoms as dyspnea and pain in the side which serve to suggest that the case belongs in the second group.

HEMOPTYSIS OUT OF A CLOUDY SKY

Cases in which the hemoptysis is an initial and uncomplicated event, justifying their inclusion in the foregoing group, comprise but a small proportion of the series. Preceding or accompanying symptoms or signs of pulmonary or other disease are more commonly present and in this group which may be termed hemoptysis out of a cloudy sky, in contradistinction to the preceding, the causes multiply and all enumerated in the list which follows are included.

THE CAUSES OF HEMOPTYSIS

Of the various causes in the probable order of frequency, pulmonary tuberculosis doubtless occupies first place in consideration of the high incidence of this disease and the occurrence of hemoptysis in about 60 per cent. of all cases at some time in their course. It is represented among the 307 autopsy cases at the Massachusetts General Hospital by only 27 cases, owing to the usual exclusion of patients in the active stage of the disease from the wards of the hospital. Chronic passive con-

gestion probably occupies second place, but heads the list of the autopsy series with 105 cases. Then follow lobar (not broncho-) pneumonia with 100 cases, pulmonary infarction with 48 cases, non-tuberculous pulmonary suppuration with 14 cases, aortic aneurism with 7 cases, new growths of the lung with 5 cases and ulceration of the trachea and bronchi due to syphilis in one case.

Copious bleeding is seldom seen apart from pulmonary tuberculosis, occasional instances of abscess and gangrene, ruptured aneurism, and ulceration of the trachea and bronchi. Insignificant hemorrhage and prominence of other symptoms and signs is the usual complex in chronic passive congestion, lobar pneumonia, pulmonary infarction, abscess, gangrene and new growth. Other causes than those enumerated in the list are rare and not found among the autopsied series. They may be grouped for the sake of completeness under such headings as mechanical injuries, toxic agents such as the fumes of irritating gases, constitutional diseases (hemophilia, leukemia, hemorrhagic purpura and scurvy); animal parasites (pulmonary distoma, hepatic distoma, echinococcus disease, filaria sanguinis and filaria lymphatica), leprosy, actinomycosis and aspergillosis.

Our records are of interest in a negative sense in their failure to confirm the still too prevalent belief that vicarious menstruation is an adequate cause of hemoptysis, no example of which is found in the autopsy series. This and other evidence indicates that it cannot properly be regarded as a cause apart from some pulmonary lesion which is tuberculous in the great majority of the cases. Hemoptysis in the course of disturbances of the nervous system, in patients with the so-called "arthritic diathesis" (Sir Andrew Clark's type) and in those with high blood pressure is likely to find its true explanation in one of the above mentioned groups.

INFLUENCE OF HEMOPTYSIS ON THE COURSE OF TUBERCULOSIS

Finally I should like to refer to the influence of hemoptysis on the course and termination of the tuberculous cases. For the most part the bleeding is intercurrent and without any appreciable effect upon the course of the underlying disease, but in certain cases the hemoptysis is a direct cause of the fatal termination, the patient dying in consequence of the loss of blood or as a result of suffocation. Hemoptysis was thus an immediate cause of death in five of this series. Of greater frequency and importance, however, is the unfavorable influence which hemoptysis may have in the spread of the tuberculous process in consequence of the aspiration of infected blood into neighboring or remote parts of the lung. This unfortunate occurrence is very clearly suggested in certain instances under observation when patients with normal temperature have hemoptysis and then in the following twenty-four to thirty-six hours the temperature rises and remains elevated until death occurs in the course of the next weeks or months. In this series there are eight cases in

which from a study of the records the hemoptysis thus seemed to be the determining factor in the fatal termination.

The danger of retention of infected blood and consequent spread of the tuberculous process is constantly to be borne in mind in the treatment of hemoptysis due to tuberculosis and it seems highly undesirable to use morphia as a routine as is so generally the custom in these cases. If morphia diminishes the irritability of the respiratory tract and suppresses cough it may actually do harm by leading to the retention and aspiration of infected material and further spread of the disease. It would seem best therefore not to use morphia except for such definite indications as an harassing and unproductive cough and extreme nervousness. It is not I believe good treatment for the hemoptysis itself.

DISCUSSION ON PAPER BY DR. LORD

Dr. H. Kennon Dunham, Cincinnati: Will the doctor kindly define what he means by hemoptysis?

Dr. Lord: I have restricted the term "Hemoptysis" in this paper to bleeding from below the larynx without regard to the amount.

Dr. Charles L. Minor, Asheville: I think it is very timely that Dr. Lord should speak at the end of his paper of the extreme abuse of morphia in the treatment of hemoptysis. I believe that the large majority of the profession of the country think there is only one remedy for hemoptysis, and that is a large hypodermic of morphia. What he has said has in the past been shown statistically that there is a distinct increase in post-hemorrhagic pneumonias where morphia is used freely. He gave the two only proper indications for it, excessive fear and excessive, uncontrollable cough. Codein will usually do just as well, and I think we ought to be very careful to spread among the general profession the danger of this practice if indiscriminate.

Dr. Babcock, of Chicago, drew to my attention one remedy in which as a result of years of trial I have come to have implicit confidence, a remedy which I have not verified by any laboratory experiments and yet which I have tested too long to doubt. The remedy I refer to is atropin in large doses—$\frac{1}{33}$ to $\frac{1}{25}$ grain—large doses, hypodermically. This will cut off the hemorrhage almost immediately. I never use it except in large hemorrhages, of a cupful or so. I find it will cut it off more quickly than anything I have ever tried, and I have tried it in thousands of cases, and can recommend it unreservedly. It must not be repeated however oftener than every 6–8 hours as it can paralyze the bladder and at times the bowel.

Speaking of the pharmacological laboratory, there was an excellent article a number of years ago in the archives of internal medicine showing that pituitrin was the ideal remedy in these cases and showing that atropin was no good. I used pituitrin faithfully, obeying the scientific mandate, and I tested it again and again, but *it did not work*. At the

same time I have tested out atropin at hundreds of bedsides and I know it does work. Dr. Babcock can verify it, and I am grateful for the point he gave me years ago. I may be just told that this is only my impression, and reminded of "Post hoc propter hoc." I have not collected, as I should, my many, many experiences, as I would like to have done for Dr. Pratt's benefit but I consider my very many bedside tests fully as good evidence as a laboratory experiment.

There is much more I would like to say, but I would overstep my time, but I want to thank Dr. Lord for bringing out the dangers of morphia.

Dr. William Charles White, Pittsburgh: Dr. Minor, I think there is another phase of the thing that you have forgotten. Many of these hemorrhages are just the hemorrhages, I think, of nose bleed that stop whether you do something or not.

Nearly every patient who has hemorrhage comes to the clinic on his feet. I don't know the exact figure, but many of them never have another hemorrhage and yet they are often put to rest with morphin. And so I think that the reliance on drugs which Dr. Minor has suggested is not a very valuable asset. Nothing could be more salutary, I think, than the remarks of Dr. Lord about morphin. Then we have forgotten that our knowledge of the pulmonary circulation was a very meager thing up to two years ago. The pulmonary blood pressure is not the aortic circulation blood pressure and is no more the blood pressure of the arm than the arm is the lungs. You can raise the blood pressure of the left side of the heart a hundred and sixty millimeters without raising the pulmonary pressure.

These attempts to give drugs upon the basis of peripheral or aortic circulation is probably ridiculous, because of this absent relation between aortic circulation and pulmonary circulation, the latter being based on an elasticity which doesn't exist anywhere else in the body. I would be glad to see all of our present drugs wiped off in the treatment of pulmonary hemorrhage and a fresh start made.

Dr. Minor: I recognize fully the type of mind which Dr. White represents. I recognize fully that it is impossible to say positively that any drug has any effect unless it is verified in a pharmacological laboratory, and even then it as often as not does not pan out at the bedside. I do not see the least relation between the case cited and the case under discussion. I have seen many cases of it. I know perfectly well a hemorrhage after a certain point will tend to stop itself. I know that such therapeutic skeptics as Dr. White find nothing easier than to deny the causal effect of a drug used in any given case, that he can always say that the result was a mere coincidence but until my judgment is paralyzed and my initiative sterilized by such an abnormal therapeutic skepticism it does seem to me that, though I cannot run a bedside pharmacological laboratory, I have a right, first on the advice of an experienced clinician whom I respect, and then from my own very extensive experience at the bedside to draw conclusions as to a drug's effects and to apply that experience for my patient's benefit.

It is a great pity that he takes this attitude. It is a great pity he would use no drugs, for such an absolute skepticism of drugs as the doctor has leads to sterility and utterly paralyzes therapeutic efforts. Faith is necessary in medicine as well as skepticism and the wise doctor will be as anxious to avoid an all denying skepticism as an uncritical all accepting faith.

Dr. Lawrason Brown: I think we all owe Dr. Lord a debt of gratitude for proving to us that what we have said for some time is correct, and that is, that all hemoptysis should be considered as due to pulmonary tuberculosis until we can prove it is due to some other cause.

I went over some cases carefully some years ago and found that those patients who had hemoptysis certainly did worse than those who did not have hemoptysis.

In regard to Dr. White's statement about the circulation in the lungs, it seems to me that he must remember where the right auricle gets the blood to supply the blood in the lungs, and that the pressure in the lungs depends more or less upon the amount of blood which is supplied the right auricle of the heart, and that if we can dilate some of the peripheral vessels, and some of the splanchnic system, we may be able possibly to reduce the pulmonary pressure.

Dr. Joseph H. Pratt, Boston: The first part, which is the major portion, of Dr. Lord's paper is a model it seems to me of what a scientific clinical paper should be, but frankly I cannot say as much about the latter part, in which he condemns the use of morphin in the treatment of hæmoptysis. It may be, as he says, that morphin is injurious and should not be given in the routine treatment of hæmoptysis, but if he brought forward any evidence that this is the case I failed to hear it.

Dr. S. G. Bonney, Denver: I have been very much interested in this paper and consider that it, together with the discussion, has been very profitable. I am not, however, in entire accord with some of the thoughts that have been expressed, chiefly with reference to the treatment of pulmonary hemorrhage and statements made as to the inappropriateness of morphine for any patients suffering from this condition.

As to the occurrence of pulmonary hemorrhage without definite recognition of tuberculous involvement, I will state that for many years my attention has been called to the disproportion apparently existing between the hemorrhages and the other manifestations of tuberculosis including the physical signs and sputum findings. Twenty-five years ago I began to note the frequency of pulmonary hemorrhages due to undoubted pulmonary tuberculosis without at that time distinct evidence of the tuberculous involvement. The proportion of such cases having a distinct hemorrhagic onset to the tuberculosis has been quite large and I have not infrequently been considerably embarrassed, shortly after the arrival of new hemorrhagic patients in Colorado, in not being able to make immediately a positive diagnosis. I recall one case which has been to me of much interest, the patient having been referred to me from Detroit and sent from there direct to Estes Park, Colorado, at an altitude of 7,500

feet. There was a history of repeated hemorrhages and the patient was bleeding copiously at the time I saw him. Owing to the hemoptysis I was unable at the time to make a complete physical examination, but after the hemorrhage was controlled to some extent I could detect upon examination no physical evidence of tuberculous infection. Repeated examinations were made during a period of several weeks with always a negative result. There was no cough, expectoration or fever. As the patient was under observation about eighteen years ago recourse to the x-ray was impossible. Subsequent developments justified beyond question the diagnosis of purpura hemorrhagia and the patient was sent home.

With reference to vicarious menstruation as the cause of pulmonary hemorrhage, I understand Doctor Lord to state that he has never been able to satisfy himself from the evidence presented in any given case that there was not some lung involvement to account for the hemoptysis. We should remember, however, that patients suffering from hemoptysis as a result of vicarious menstruation do not die and it is impossible therefore to secure definite postmortem evidence as to the condition.

I recall a patient who was sent to Colorado many years ago, with an exceedingly bad family history, both parents having died of tuberculosis and several brothers and sisters. The lady was the wife of a physician, and having had repeated pulmonary hemorrhages, climatic change was advised. To my surprise I was quite unable to find any physical evidence of tuberculous infection, and still more so when a few weeks after arrival, in the midst of an apparently good general condition, there took place a large pulmonary hemorrhage. She rallied from this very quickly and experienced another hemorrhage at the end of one month, and still another after a similar period. This continued for several months, in the absence of ordinary menstruation, and after a somewhat prolonged observation the conclusion that the hemoptysis was dependent upon vicarious menstruation solely seemed entirely justified.

Although I have almost reached the time limit allotted for discussion, I would like to say just one word with reference to the treatment of pulmonary hemorrhage. I wish to call attention to the fact that it is not the disease we are treating but the individual. It is my belief that there is no conventional method of treatment which is appropriate for all cases of pulmonary hemorrhage. In addition to the size of the hemorrhage, the extent and character of pulmonary involvement and other complicating conditions, we must take into consideration the extent and nature of any existing mental disturbance as well as the personal peculiarities and idiosyncrasies of the patient. In other words, after a careful analysis of the different phases of the situation we are compelled to adapt ourselves as far as possible to the conditions which appear in each instance. It is apparent that in some cases we are perfectly justified in using no medication whatever. A few words of encouragement and reassurance, careful attention to the conditions of the sick room, cautioning the patient and family against excitement, conversation; admonishing against turning suddenly from side to side; endeavoring to control restlessness

and cough; proper attention to the bowels, etc., are often quite sufficient, together with a slight elevation of the head of the bed. In other cases most active and energetic measures are absolutely required involving not only the cautious administration of morphine but even the performance of an artificial pneumothorax to control bleeding. I believe it is very unfortunate for any expressions to be made in this meeting to the effect that we should use no medication and especially no morphine in any cases of pulmonary hemorrhage. I know of no condition in medicine that calls for the skill, the judgment and the discretion and the resourcefulness of the physician as is required in the intelligent treatment of pulmonary hemorrhage.

Dr. Lord: So far as the treatment of hemoptysis with any drug is concerned, I have no evidence to present, but my impression is that drugs are not helpful.

Regarding Dr. Pratt's criticism, I should be sorry to leave the impression that I myself think that there is specific evidence against morphia in what I have presented. In the cases to which I have referred the danger is not so much that the patient will die at once from the bleeding itself as ultimately from the extension of the tuberculous process in consequence of the aspiration of infected material. It seems fair to assume that if morphia accomplishes the purpose for which it is commonly given, that is, if it depresses the irritability of the respiratory tract and leads to the suppression of cough when infected blood is present in the bronchi, it would then be harmful in the treatment of hemoptysis except for the special indications I have mentioned.

TUBERCULOSIS OFTEN OF SECONDARY IMPORTANCE TO OTHER PATHOLOGICAL CONDITIONS

By C. D. Parfitt, M.D.

Gravenhurst, Ont.

Our present conception of tuberculosis is that there has been tuberculous implantation existing for many years in most people and that clinical tuberculosis is the result of lowered resistance to the infection. Tuberculosis is a physical incubus which must be reckoned with as possible in every one, and, likewise, the tuberculous patient is subject to other ills. The development of pulmonary tuberculosis is often influenced by the presence of other chronic disorders (of either infective or functional nature) which are of such individual and diverse character that they are relatively slighted in treatises dealing with ætiological and modifying conditions. Whatever the cause of lowered resistance which allows tuberculosis to get the upper hand, the course of the tuberculosis is certainly influenced by other physical disorders related to it or quite distinct from it. If one can banish or relieve these, the tuberculosis will often be taken care of by the improved physical resistance.

Sometimes diseases which, from the standpoint of diagnosis must be differentiated from tuberculosis, may be associated with an actual tuberculosis. Desirable as it is to have a single cause explain all symptoms, one diagnosis will then be insufficient. The recognition of the tuberculosis may too readily stop further investigation.

Dr. Lawrason Brown's [1] series of cases of Hodgkin's Disease and Carcinoma with tubercle bacilli in the sputum, illustrate such coincidence and emphasize the intricacies of diagnosis. There are, however, many pitfalls with diseases of more commonplace nature. Focal infection, such an important factor in systemic disease, plays an important part, also, in a chronic disease like phthisis. Four years ago at this meeting, Dr. Thayer provoked an interesting discussion on the differentiation of suspected tuberculosis from focal infections of the head. My recollection is that the tuberculosis under consideration was a matter of suspicion, because of constitutional symptoms, when definite signs of pulmonary lesion were lacking. Cases with such focal infections are occasionally found which show also physical signs of a pulmonary tuberculosis, more or less pronounced. In such instances there is even greater simulation of phthisis, and the stigmata of that disease as found in the history, e.g., the evidence of toxæmia, blood spitting, the questionable findings of tubercle bacilli and a tuberculin reaction, are confusing and leave much to speculation. In some of these cases the presence of tuber-

culosis is far from proven, while in others it must be accepted, but the secondary infection may fairly be considered as playing the more important part in the illness. Indeed in some instances the tuberculosis may rather be regarded as the secondary infection. The non-tuberculous infection may be the important depraving influence because of which phthisis has developed, or it may be a result of the general constitutional weakening produced by the tuberculous infection.

Some illustrative cases which I have noted fall into two groups — one where pathological conditions of the respiratory tract accompanied or simulated tuberculosis, and the other where disease of the abdomen or pelvis existed with pulmonary tuberculosis and fostered its development. In the first group are the following:

1. A woman has had recurrent bronchitis and mild constitutional symptoms of toxæmia for nine months. There are definite signs of infiltration in the left upper lobe and more diffuse signs of bronchitis elsewhere. The v. Pirquet test is positive. Accessory sinus disease is noted. The patient is referred to a rhinologist and after operative treatment she returns to the sanatorium for two months. On leaving she is apparently well. Bronchitis has quite disappeared except for a few small râles in a limited area near the site of greatest original intensity. She has gained seventeen pounds and there has been no fever since her operation. The sputum has been negative. M. Catarrhalis only has been found in washed sputum. Nine months later her physician reports excellent health.

Here there was possibly an old tuberculous lesion and there was a bronchitis secondary to a chronic sinusitis.

2. A man with symptoms referable to the chest for nine months, and cough, sputum, frequent bloody expectoration, loss of weight and recurrent fever for four months, is found to have a bilateral basal bronchitis, with slight changes on percussion on the left side. An ophthalmic test with ½ per cent. old tuberculin causes an intense local, general, and slight focal reaction. The sputum is negative. An extreme atrophic rhinitis is found and the whole nasal cavity is covered with adherent crusts. Treatment of this condition causes prompt disappearance of the cough, and expectoration almost stops. The patient improves greatly in general condition and returns to his work of car foreman after five weeks' treatment. Since then he has not lost a day from work in nearly five years.

A bronchitis secondary to the rhinitis may here have activated an old tuberculosis, or there may have been a recent infection which in itself was secondary.

3. For four years a woman has had purulent expectoration, often persistently blood stained. There has been frequent slight pleurisy, some dyspnœa and increasing weakness. Fever is rare. There is no anemia. The Arneth index is consistently high. Intestinal stasis, frequent headaches and mild Raynaud's disease are accompanying disorders. The pulmonary signs are vague and inconsistent. A slight scoliosis can ex-

plain slight deformity and percussion changes. There is the history of nasal disease since early childhood for which there have been many operations including the opening of three sinuses. Repeated examinations of the sputum with antiformin fail to reveal bacilli and animal inoculation is also negative. The sputum contains a practically pure culture of Friedländer's bacillus. An autogenous vaccine modifies the character of the sputum and produces local, focal and general reaction. Reaction is also obtained to 3 mg. of old tuberculin, local, general and slight focal. There is no material change in the pulmonary symptoms after six months' treatment.

A long standing bronchitis with bronchiectasis secondary to nasal disease may have, in this instance, permitted secondary tuberculous implantation, or may have furthered the development of an old lesion.

4. A young farmer for a year and a half has had constitutional symptoms of a toxæmia, with expectoration, and two small hemoptyses. He reports that twice a single bacillus has been found in the expectoration. There is reason to doubt the finding. The chest examination shows a slight sclerosis of the upper left lobe and a slight diffuse bronchitis. Repeated examinations of the sputum with the aid of antiformin are negative and animal inoculation is also negative. Much inspissated secretion is noted in the larynx and trachea which can only be removed in part and with difficulty. Small white growths embedded in the mucous membrane of the larynx and at the base of the tongue are removed with punch forceps. A diphtheroid organism in almost pure culture is obtained. An autogenous vaccine is given irregularly for nine months, during which time the patient improves. A year and a half later the patient is perfectly well with only the sign of a slight sclerosis of the left lung remaining.

There was probably an old tuberculous involvement of the left lung; but the peculiar character of the agent causing the bronchitis suggests that this organism was the cause of illness.

In these cases, with one exception, measures other than those of a hygienic and dietetic nature materially helped to restore health, and in all, the possibly tuberculous condition of the subject may be considered relatively unimportant. In all of these patients a diagnosis of tuberculosis would be reasonable, and they could readily be classed in sanatorium records as moderately advanced cases without bacilli, falling into the ranks of the 33 per cent. of abacillary cases found in sanatoria.

Notwithstanding the difficulty of proof and the vexed opinions of bacteriologists and clinicians, it is a matter of common experience that secondary, accompanying or intercurrent infections of the respiratory tract play an important, often a controlling, part in the course of pulmonary tuberculosis. The reactions to autogenous vaccines, of local, focal and general character, themselves suggest the relationship between the organism found in carefully washed sputum and the pathological process.

Von Hansemann [2] maintains not only that in many cases of the tubercle bacillus, if present at all, represents merely a secondary in-

fection, but also that even in true tuberculous phthisis it is only one of the ætiological factors. In a majority of instances of atypical cases he considers it possible to discover the special ætiological factor concerned, and believes that in all such cases it is more essential to deal with the primary condition than to remove the bacillus.

Lord [3] in his clinical and pathological studies of non-tuberculous affections of the lungs finds that 10 per cent. of bronchopneumonias have well-marked indurative and ulcerative processes which clinically resemble pulmonary tuberculosis. Ash [4] finds that 11 per cent. of cases which come to autopsy in institutions for advanced cases of tuberculosis are non-tuberculous. We must evidently be on guard for the atypical cases.

The cases of the second group present a more clear-cut illustration of my subject, since in all of them the existence of pulmonary tuberculosis is admitted and the question of differential diagnosis does not arise.

An indolent or retrogressive pulmonary lesion may quickly become active because of the development of tuberculous enteritis which is possibly amenable to surgical interference. Material improvement can be obtained in a fair proportion of cases if recourse to the surgeon is prompt, and I believe exploratory incision, at least, is warranted more frequently than it is done.

Five patients were referred to the surgeon for short-circuiting operations for tuberculous enteritis. Two are alive, six and five years respectively, since their operations. In one of these cases (case 5) an advancing pulmonary lesion was arrested and the patient has not been as well for years as she is to-day and she leads an arduous life. A third had nine inches of a hyperplastic tuberculous cæcum removed. This condition complicated an advancing pulmonary lesion, with much cough and expectoration, and its influence upon the pulmonary condition is noteworthy. After the operation the patient coughed but three times in as many weeks and sputum was much diminished. He died six months later of spontaneous pneumothorax and was saved a good deal of suffering by the ileosigmoidostomy. These three cases emphasize the influence of a second area of tuberculous disease upon the symptoms and progress of the pulmonary lesion. Two cases died within two days of the operation. They were not good risks and the result shows that the operation should have stopped with the exploratory incision in one case. Also it is fair to say that in the other case I did not have the privilege of making the arrangements. Two months were lost after operation was first considered and the technic of the operation was subject to criticism.

5. A woman, aged 35, developed phthisis during lactation. There was a long standing history of irregular pulmonary symptoms and of diarrhœa. Much sputum had been swallowed. Physical signs in moderate degree were present in three lobes. A thickened, tender cæcum and sensitive transverse colon and sigmoid were felt. Marked peristalsis of the ileo-cecal region was usually visible. Obstruction was

obvious and cramps and diarrhœa were of daily occurrence. Cough and expectoration increased during three months. The pulmonary lesion advanced and bacilli were found occasionally in the sputum, and also in stool. Relief for the abdominal distress was necessary. The patient was referred to the surgeon for exploratory incision with a short-circuiting operation in view. Tuberculous patches were found in the colon. An ileosigmoidostomy was done, and at a later operation, the distal end of the ileum was converted into an ostium. The intestinal condition became more endurable and the pulmonary condition gradually improved. Three years after the operation the patient was apparently cured. Two years later the patient writes that her health, notwithstanding much strain, has been better than for many years.

Intestinal adhesions following an appendicectomy caused symptoms which simulated tuberculous enteritis and awakened an old pulmonary lesion. Surgical interference has thus far given great relief and the pulmonary condition has become quiescent.

6. A woman, aged 24, with pronounced history of family phthisis, of exposure, and with signs of infection of glands, lungs and rectum during fifteen years, has had mild symptoms of clinical tuberculosis for six months with recent slight hemoptysis. The appendix had been removed four years earlier and suppuration for several weeks followed the operation. Since the operation tenseness of the abdomen and radiating pains on the right side have been frequent. For two months diarrhœa, cramps and local sensitiveness have been marked. During five months' observation there was no expectoration, but at two menstrual periods there was slight hemoptysis. Old disease was found at the apices and sometimes an occasional crepitation was heard. The pulmonary condition seemed relatively insignificant and because of increasing abdominal distress and rising temperature an exploratory operation was urged. Unfortunately, the fæces had not been examined for bacilli. Only adhesions around the cæcum were found. Notwithstanding ether anæsthesia the pulmonary condition did not relapse. The abdominal symptoms and general health have been greatly improved during the nine months since the operation and the pulmonary symptoms have subsided. The patient has resumed work.

Chronic appendicitis may be the dominant disorder in cases in which improvement hangs fire. The removal of an appendix can change a relapsing pulmonary patient into an arrested case or hasten recovery in a patient with a recent lesion. In two instances here given ability to work at the usual occupation was quickly recovered after removal of a tuberculous appendix in one, and a non-tuberculous appendix in the other.

7. A man, aged 31, relapsed after a six months' period of work at the end of four years' treatment for phthisis. He had suffered a number of relapses of short duration, and, during much of the time, intestinal indigestion and abdominal sensitiveness had been marked. An expert on digestive disorders who was consulted, considered him a neurasthenic. There is evidence of long standing disease in four lobes and recent

signs at the left apex. A tender appendix is found. The patient is ill for several weeks with combined pulmonary and abdominal symptoms. After two months the appendix is removed and on microscopical examination it proves to be tuberculous. Variable symptoms of indigestion recur during an additional year of "cure," after which time he is seen again. The pulmonary lesion is quite inactive, but there are pronounced symptoms of intestinal intoxication, along with a marked indicanuria. With modified diet, exercise and work, these symptoms largely disappear and quite hard work has now been carried on for eighteen months.

8. A man, aged 25, suffered from recurring abdominal pains for five years following typhoid fever. After four years symptoms of a mild toxæmia developed and he was treated as tuberculous. There is an indolent tuberculosis of the right lung. Cough and expectoration have been absent, but after an influenzal cold bacilli were found. The appendix can be felt and he is seen during a characteristic attack. A very long and thickened appendix attached to the sigmoid is removed, which, on microscopical examination is not found to be tuberculous. Three months after the operation he returned to his work which has been consistently followed for three years. He is apparently cured, in excellent health, and the lungs show few signs of the old lesion.

A latent focus of infection in the pelvis can produce a toxæmia resembling tuberculosis. The removal of bilateral pyosalpinx cleared up irregular febrile attacks in a case of indolent pulmonary disease. No symptoms pointing to pelvic disease had been obtained in the history and there was nothing to indicate the need of examination until pains at a menstrual period, several months after the patient first came under observation. Six years later this patient was in very good health and when last seen, three years ago, there had been no material change in the lung lesion.

Reflex and congestive disorders occurring with menstruation can so depress the general health that sufficient resistance to overcome the pulmonary disease cannot be gained in the interval. The removal of both ovaries and the appendix benefited to a remarkable degree a woman who was so prostrated by the menstrual period that it seemed impossible that any gain could be made until the functional derangement was altered. An advanced pulmonary tuberculosis improved rapidly when the recurring prostrating headaches and severe abdominal symptoms were relieved by operation.

9. A married woman, aged 39, has for two years had symptoms in varying degree of an active advanced tuberculosis. There is also mild hyperthyroidism. Two attacks of appendicitis have occurred in thirteen years. The patient has long been subject to frequent intense headaches with vomiting. Severe dysmenorrhœa is usual. Examination reveals a disseminated tuberculosis affecting all lobes. Bacilli are present. The thyroid and heart are enlarged. Hæmoglobin is 75 per cent. and the Arneth index 83. A small movable mass and tenderness are noted

TABLE OF CASES

Number	Sex	Age	Extent Lung Lesion Turban	Condition Requiring Operation	Operation
1 C. B. C.	M	25	T III c	Cervical Adenitis Cervical Adenitis	Extensive Excision Extensive Excision
2 H. G.	M	23	T III c	Tuberculous enteritis	Ileocolostomy
3 M. C. M.	F	27	T I	Bilateral pyosalpinx Abdominal fistula	Removal
4 G. W. D.	F	44	T I Pleurisy	Menorrhagia	Curettage
5 G. N. H.	M	23	T II	Appendicitis	Interval appendicectomy
6 V. C.	F	24	T III	Pregnancy Pregnancy	Operative termination Operative termination
7 E. M.	M	30	T I	Mucous colitis	Appendicostomy
8 L. R.	F	23	T I	Pyloric stenosis; Gastrectasis	Gastro-enterostomy
9 E. O.	F	35	T I	Tuberculous enteritis Tympanites	Ileosigmoidostomy Ileostomy
10 O. K.	F	23	T I	Tuberculous enteritis	Ileosigmoidostomy
11 E. B.	F	24	T III	Tuberculous abscess near hip joint	Excision of sinus
12 A. M. C.	F	25	T III	Pregnancy	Operative termination
13 K. W. S.	M	26	T III c	Tuberculous enteritis hyperplastic	Excision Ileosigmoidostomy
14 C. M. S.	M	25	T I	Chronic Appendicitis	Appendicectomy
15 H. A. F.	M	30	T II	Chronic Appendicitis (tuberculous)	Appendicectomy
16 E. F.	F	20	T I	Menorrhagia	Curettage
17 M. D.	F	34	T I	Menorrhagia	Curettage
18 G. A. W.	M	27	T II	Tuberculous enteritis	Ileosigmoidostomy
19 F. R.	F	39	T III	Menstrual reflexes; oophoritis, appendicitis	Bilateral ovariotomy Appendicectomy
20 C. K.	F	24	T I	Intestinal adhesions	Separation
21 E. T.	F	33	T III	Ovarian hematoma	Ovariotomy Appendicectomy

GROUP II

Anesthetic	Date	Result of Operation	Effect on Lung Lesion	Ultimate Result
Chloroform and Ether	21. V. 09	Cure	Improvement	Died 4½ years later of spontaneous pneumothorax.
Chloroform and Ether	31. V. 09			
Nitrous Oxide, oxygen, Chloroform, ether	2. XII. 09	Peritonitis: died in two days		
?	? ? ?			
Chloroform and Ether	31. I. 10.	Prolonged convalescence. Temporary Morphinism.	Slight increase of signs	Well; apparently cured.
Chloroform and Ether	24. II. 10	Slight improvement	Unknown	Well; apparently cured.
Chloroform	1. VI. 10	Good recovery	Unknown	Relapse 1 year later. Apparently cured. 2 years at work.
Nitrous oxide and oxygen	? VII. 10	Good recovery	Improvement	Died 3 years later of spontaneous pneumothorax.
Nitrous oxide and oxygen	? VIII. 11	Good recovery	Improvement	
Nitrous oxide and Ether	5. IX. 10	Improvement	Arrest	Apparently cured. 2 yrs. at work. Suicide 4 yrs. later.
Nitrous oxide and Ether	16. IX. 10	Shock; died in 2 days		
Nitrous oxide and oxygen	3. XII. 10	Improvement	Arrest	Apparently cured.
Nitrous oxide and oxygen	13. V. 11	Improvement		
Nitrous oxide and oxygen	? III. 11	Improvement	None. Already arrested	Semi-invalidism
Nitrous oxide and oxygen	13. V. 11	Cure	?	Very well 5 years later.
Nitrous oxide and oxygen	19. VII. 11	Good recovery	Improvement	Died 2 years later.
Nitrous oxide and oxygen with local	31. V. 12	Improvement	Improvement	Died 6 mos. later of spontaneous pneumothorax.
Nitrous oxide and oxygen with local	17. VI. 12	Good recovery	Arrest	Apparently cured. At work 3½ years.
Nitrous oxide and oxygen	? VII. 12	Good recovery	Arrest	Arrest; at work 1½ years.
Nitrous oxide and oxygen	27. VII. 12	Improvement	Arrest	Apparently cured.
Ettyl Chloride and Ether	3. IX. 12	Improvement	Unknown	Well (arrested).
Nitrous oxide and oxygen	23. II. 15	Shock; died in 2 days		
Nitrous oxide and oxygen	19. VIII. 15	Good recovery	Improvement	Much improved.
Ether	? X. 15	Good recovery	Unknown	Arrested; at work.
Nitrous oxide and oxygen	10. V. 16	Good recovery	Unknown	Improved.

in the right iliac fossa. For three months there is both constitutional and local improvement. The third menstruation was accompanied by excruciating headache, nausea, vomiting and frequent micturition. Pain in the right iliac fossa was constant, radiating to the sacro-iliac region. Tenderness and rigidity were marked. After similar symptoms and signs were observed at the next period, she was referred to the gynecologist as it seemed that further improvement was impossible in the face of such prostrating illnesses. Because of the not distant menopause, ovaries as well as appendix were removed. The appendix was bound down by a very short mesentery, but it did not appear to be diseased. The ovaries were cystic. When the patient left, three months after the operation, she was greatly improved. There was no abdominal pain, headaches were rare, hæmoglobin was 95 per cent. and physical signs had maturally diminished. Four months later she writes that for periods she has been without cough and expectoration and that her health has improved in every way.

The indolent tuberculosis occasionally seen in women who give a history of excessive menstruation is possibly the result of and is maintained by this recurrent drain. I have found that sanatorium treatment alone does little for these patients and they have been referred after a short period of observation and training to a gynecologist. Their history has ultimately been satisfactory.

Five per cent. of my sanatorium patients during the last seven years have had to undergo major surgical operations with general anæsthesia; but of twenty-one (four underwent two operations) only three have failed to be materially improved after operation. These three were all desperate cases and the patients died. The need of operation was obvious in most, but was urgent only in two cases. In spite of surgical shock and anæsthetic, the pulmonary condition in no case became worse. In some instances the improvement in the local tuberculous condition was dramatic, as soon as the basic cause of illness was removed. Seven became "apparently cured," three "arrested," eight "improved." Of the "improved" four subsequently died. The table on pages 124 and 125 gives some details:

Apart from the urgency that demands immediate operation, surgical measures evidently may be of great value in the treatment of phthisis. Their proper use is one of our responsibilities and one of our problems. Billings[5] emphasizes the necessity of the removal of the focus of infection as a fundamental principle in the treatment of systemic disease, especially of a chronic type. McArthur[6] urges short-circuiting operations when excision cannot be undertaken, for intestinal tuberculosis other than the hypertrophic form, the abdominal operation, of course, depending upon the pulmonary and general condition. Exploratory incision may be necessary. For ileo-cæcal tuberculous disease operative interference is a not uncommon surgical procedure, Maylard.[7] Lane[8] recommends radical measures to remove the depraving influence of intestinal stasis.

The tuberculous patient is of course not to be lightly subjected to operations, but time and opportunity may easily be lost by undue delay. Pulmonary tuberculosis may be taken as a final and complete diagnosis to the exclusion of any other. Unless each diagnosis is questioned, and, when established as tuberculosis, further looked into for other possible modifying disease, a considerable number of patients will fail to recover. It is, therefore, necessary to individualize in every case.

The important thing is the point of view that there may be a depraving influence within the body which can be found and remedied. Remediable disorders certainly occasionally prepare the soil for developing tuberculosis and help to further its progress when already established. When relieved of such handicaps a tuberculous patient may frequently develop sufficient resistance to obtain a relatively speedy arrest of his disease.

1. Brown: Bull. Johns Hopkins Hosp., 1914, xxv, 112.
2. von Hansemann: Berl. Klin. Wchnschr., 1911, xlviii, 1.
3. Lord: Boston Med. and Surg. Jour., 1905, clii, 537, 574.
4. Ash: Jour. Am. Med. Assn., 1915, lxiv, 11.
5. Billings: Jour. Am. Med. Assn., 1914, lxiii, 899.
6. McArthur: Surg., Gynec. and Obst., 1906, August; "Tuberculosis" Ed. by Klebs, New York, 1909, 756.
7. Maylard: "Abdominal Tuberculosis," London, 1908.
8. Lane: "Operative Treatment of Chronic Intestinal Stasis," London, 1915.

DISCUSSION ON PAPER BY DR. PARFITT

Dr. Alfred Meyer, New York: I would like just two minutes. I couldn't follow the paper as closely as I wanted to but I do wish to urge the members of this Section who were at the Pathological Section yesterday afternoon, to try to introduce into their tuberculosis service the complement fixation test in doubtful cases, or in cases of other diseases that may possibly be complicated with tuberculosis in some form. The figures now catalogued in different parts of the world indicate with rather remarkable unanimity the great value of this test in confirming proven cases, bacteriologically proven cases of tuberculosis, also the very large percentage of cases of not proven tuberculosis, i.e. in cases that have negative sputum but are clinical suspects, but have positive complement fixation.

Thirdly. A large portion of cases that are evidently not cases of tuberculosis have a negative reaction. I can give you the figures but owing to the lateness of the hour I will not do that. But the percentages in some laboratories are perfectly remarkable. All of you will be able to read the papers presented yesterday, and I think you will find them profitable.

Question from the floor: What anæsthetic did Dr. Parfitt use?

Dr. Parfitt: Gas with oxygen was alone used in fifteen cases; ether was used in some combination in nine.

RESULTS OBTAINED BY THE CLASS METHOD OF HOME TREATMENT IN PULMONARY TUBERCULOSIS DURING A PERIOD OF TEN YEARS

By Joseph H. Pratt, M.D.

Boston

Nine years ago I presented before this Association a report of the work of the first tuberculosis class. In that paper and in others which I have published a full description is given of the methods employed.

The Emmanuel Church Tuberculosis Class was organized July 1, 1905. Its object was the sanatorium treatment of consumptives in their own homes. From the outset insistence was placed upon rest in the open air. The patients were provided with facilities for taking the out-of-door treatment. They lived on porches or in tents or shacks erected sometimes on roofs and sometimes on the ground. When the condition of the patients permitted they came to the class meetings, which were held weekly. As time passed more and more insistence was placed upon absolute rest in the active stage of the disease even in non-febrile patients. The patients took their own temperature and pulse and entered in record books details of their daily life, such as the hours out of doors, symptoms, and the amount of exercise, when exercise was allowed. The home visiting was done entirely by the class nurse. Patients in all stages of the disease were admitted. No one was refused who promised to follow instructions faithfully, but strict obedience to the rules and regulations was required.

During the first ten years 206 patients were treated as regular members. This number included all those who attended at least three meetings and followed the treatment for a month. Eleven are excluded from the list because they attended only one or two meetings. Three were examined and would have been admitted if they had not refused to follow the required treatment. Four patients were so ill when they sought admission that they were never able to attend a meeting. These were instructed at home in the rest treatment and were cared for until their death. Two were referred to other organizations after having been less than three weeks in the class. Six were admitted to the class with the diagnosis of pulmonary tuberculosis but on further study were found to be suffering from other diseases. In the analysis that follows these patients are not considered.

From July, 1905, to July, 1914, 189 patients were admitted. The later careers of all but 4 of these have been traced. The condition of those living on July 1, 1915, was as follows: Well and working, 104; living but unable to work, 14. There have been 69 deaths. Twenty-nine of these

deaths occurred while the patients were members of the class. Fifty-six per cent. of all those admitted to the class in the nine years were restored to health. The majority of these were beyond the incipient stage of the disease when they sought treatment in the class.

When patients are treated in their homes it is possible to keep them much longer under supervision than when they are treated in a sanatorium. All of the patients who remained in the class until their health had improved to such an extent that in my opinion the activity of the disease was arrested and they were able to return to work were "graduated" from the class. The results in this group of cases are especially interesting. Up to July 1, 1915, there had been 88 graduates. The careers of all but one of these have been traced.

TABLE I. GRADUATES WELL AND WORKING, JULY 1, 1915.

Date of Graduation	No. of Graduates	Date of Last Report	Well and Working	Not Traced	Per Cent. Well	Years Since Graduation
1906	10	1915	5		50	9
1907	9	1915	8		89	8
1908	13	1915	12		92	7
1909	16	1915	13		81	6
1910	11	1915	10		91	5
1911	7	1915	6		86	4
1912	10	1915	9	1	90	3
1913	5	1915	5		100	2
1914	7	1915	7		100	1
	88		75			

82 per cent. of those who graduated between 1906 and 1911 inclusive were well and working, July 1, 1915.

85 per cent. of those who graduated between 1906 and 1914 inclusive were well and working, July 1, 1915.

It is interesting to note that eight of the ten graduates in 1906 had tubercle bacilli demonstrated in the sputum while under treatment, and that the two patients with negative sputum died of consumption. Two of the four deaths were due to acute lobar pneumonia, and they occurred in men who had been free from symptoms of pulmonary tuberculosis for a long time. One of these men was 63 years old at the time of his death.

Out of 106 patients in whom tubercle bacilli were found in the sputum 55 are living and 49 are dead. In the histories of 52 patients there is no record of the sputum examination. Of these 35 are living and 16 dead. In 53 patients all the sputum examinations were negative. Of these 47 are living and 5 dead.

We have traced 69 of the 72 former members who left the class for different reasons before the disease was apparently arrested. Eight withdrew from the class against advice and returned to work, because they considered themselves sufficiently recovered to do so. Their after-careers proved I was wrong and they were right. Five reported well on July 1,

1915, 2 living but not well, 1 not traced. Eleven moved away from Boston, usually to the country; 3 are well, 1 living, 7 died. Fifteen were dismissed for disobedience of the rules; 6 are well, 1 living, 8 died. Two were dismissed for drunkenness; both died. Eighteen dropped out of the class voluntarily, either because they were unwilling longer to follow the strict discipline or because they did not like the class meetings; 7 are well, 4 living, 7 died. Two were transferred to hospitals; 1 died, 1 untraced. Eight left the class to enter sanatoriums; 1 is well, 4 living, 3 died. Two were transferred to another tuberculosis class; both died. Two left to be treated by their family physician; 1 is living, 1 died. Three moved to Colorado, California and New Mexico; 1 well, 2 died. One left the class owing to a complicating disease, arthritis deformans, and died several years later.

I wish to emphasize the importance of prolonged rest out of doors in obtaining the excellent results recorded in this report. During the first two years I allowed my patients to take graduated exercise in the form of walking as soon as they were free from fever, the pulse slowed, and the weight increased. Since then I have prolonged the rest treatment and have not allowed exercise until I considered the activity of the disease had been definitely checked. The patients were often kept at rest for months, but I allowed them if they had no fever to go to the lavatory and usually permitted them to take their meals at the table. During the early years reclining chairs were largely used, but later the rest treatment was chiefly carried out with the patient in bed.

A comparison of the results obtained by the two methods of treatment shows that the strict rest treatment yields the best results.

I have taken the first thirty cases in which the exact date that exercise was begun was recorded on the records and analyzed the group. This includes the patients admitted from July, 1905, up to November, 1906. The average time that graduated exercise was begun, taking the statistical mean, was seven weeks. The mean duration of treatment was 7½ months. In 17 or 56 per cent. of the cases the disease was apparently arrested. Eleven or 36 per cent. were well and working on July 1, 1915. In this group 58 per cent. of the cases with positive sputum recovered; 37 per cent. of these were well July 1, 1915.

In the second group of 30 cases admitted between July, 1908, and March, 1911, the average time (mean) at which exercise was begun was 4 months, and the duration of treatment 8½ months. In 23 or 76½ per cent. the disease was apparently arrested. Twenty-two were living July 1, 1915, and 20 or 66⅔ per cent. were working and considered themselves well. The disease was arrested in 63½ per cent. of the patients with positive sputum.

The cases in the two groups have been analyzed according to the stage of the disease on admission to the class. In order to remove the personal equation Dr. P. Challis Bartlett, for three years superintendent of the Massachusetts State Sanatorium at Rutland, has kindly gone over the records taken on admission to the class and the arrangement of the cases

TABLE II. EFFECT OF PROLONGED REST ON RECOVERY IN PULMONARY TUBERCULOSIS.

	Number of Cases	Average Time After Entrance When Exercise Was Begun	Average Duration of Treatment	Disease Arrested	Well July 1, 1915	Dis. Arrested in Patients with Positive Sputum
Group I, 1905–06	30	7 weeks	7½ months	56%	36%	58%
Group II, 1908–11	30	4 months	8½ months	76½%	66⅔%	63½%

TABLE III: CASES IN THE TWO GROUPS ARRANGED ACCORDING TO THE STAGE OF DISEASE ON ADMISSION.

Group I (Admitted 1905–1906):

	No. of Cases	July 1915			Percentage Well
		Well	Living	Dead	
1st stage	5	4		1	80
2d "	13	7		6	54
3d "	12	3	1	8	25

Group II (Admitted 1908–1911):

	No. of Cases	July 1915			Percentage Well
		Well	Living	Dead	
1st stage	11	11		0	100
2d "	13	6	2	5	46
3d "	6	2		4	33⅓

in the various stages in the following table is based on his classification.

We are now able to compare the after-results obtained by our plan of home treatment for poor patients with those obtained by the sanatorium treatment. In two leading English sanatoria for well-to-do patients 52 per cent. of the patients discharged were well or alive 4 to 8 years afterwards. (Bardwell.) Among a large series of patients treated in the Massachusetts State sanatoria Miss Farmer found that 24 per cent. were leading normal lives 4 to 7 years after their discharge. Of our 88 patients who left the class 4 to 8 years ago 60 per cent. are well and working and 66 per cent. are alive.

The results I am sure would have been better if I had been able to give more time to the treatment and especially to the after care of the patients. I am not a specialist in tuberculosis and this has been simply a part of my work in internal medicine. I have never visited the patients in their

homes. I have seen them only in the class meetings and at the time the physical examinations were made.

The expenses of the class have been borne by the Emmanuel Church of Boston, which has given me during the ten years the services of a nurse and has provided some money for aiding patients who have scanty means to lead the outdoor life. The total expense has been about $16,500. I have been helped by half a dozen assistants but I am the only one connected with the class in the beginning who is still attached to it.

In closing I wish to make a few statements in regard to the financial returns. The ex-patients during the past year have earned according to carefully collected statistics in round numbers $50,000. The total earnings of the ex-patients since leaving the class amount to about a quarter of a million dollars. The first two graduates have earned between them $18,000, which is more than the entire expense of the class during the period of ten years.

D'ESPINE'S SIGN; ITS SIGNIFICANCE IN PULMONARY AND GLANDULAR TUBERCULOSIS

By H. S. Hatch, M.D.

Nopeming, Minn.

(Read by Title)

A few years ago D'Espine [1] called attention to the fact that auscultation of the whispered voice over the spine gives rise to a sign that is quite distinctive. The method of eliciting this sign consists of having the patient speak in a low voice, or, preferably have him whisper the words " One, two, three " while the examiner listens with the bell of his stethoscope held over the spinous processes.

Normally, in children, the whispered voice has a characteristic bronchial quality which extends down as far as the first dorsal vertebra, but in normal adults it may be heard down as far as the third or fourth vertebral spine. This difference, according to Zabel,[2] is due to the fact that in children the bifurcation of the trachea is considerably higher than in adults. If there are enlarged bronchial glands, the sign extends farther down. This acoustic phenomenon has been called Aphonious Pectoriloquy. If one listens carefully, it will be observed, in most cases, that the final " E " of the last word " three " is heard for an appreciable time after the voice stops. Gray [3] refers to this as the " Post Phonal Quality."

Stoll,[4] Barut, Leroux, Zabel, Krantz and Roach all agree that D'Espine's sign is a most valuable physical sign in the diagnosis of enlarged bronchial glands. Since enlarged bronchial glands are so frequently a precursor or accompaniment of pulmonary tuberculosis, it may be of interest to know the frequency and extent of D'Espine's sign in 140 cases of pulmonary tuberculosis, in all stages of the disease, and in 35 glandular cases, all of which were examined at Nopeming Sanatorium.

In the following tables, the letters " I " and " C " refer to the character of the tuberculous lesion as indicated by physical signs, i.e., whether infiltration or consolidation, and the numerals refer to the ribs or vertebral spines to which the lesions extend. The cases are divided into incipient, moderately advanced and far advanced, according to the classification adopted by the National Association for the Study and Prevention of Tuberculosis.

It will be seen from the above tables that in the majority of pulmonary and glandular cases, the whispered voice is heard much lower than normally. In the 50 far advanced cases, its average extent was to the sixth dorsal vertebral spine. In the 38 incipient cases its average extent was to between the fourth and fifth vertebral spines. Of the 19 cases in which

TABLE I INCIPIENT

Case No.	Front		Back		D'Espine's Sign
	Right	Left	Right	Left	
28	I. below 5				4 v. s.
58				I. 3	6 v. s.
101	I. 2				4 v. s.
103				I. opposite 5	4 v. s.
105	I. 1				5 v. s.
106	I. 1		I. 3		5 v. s.
110					4 v. s.
117			I. 5	I. 3	8 v. s.
131	I. 3				3 v. s.
144					3 v. s.
145	C. 3		C. 3		6 v. s.
155		I. 3			3 v. s.
158	C. 3				3 v. s.
177				I. 5	8 v. s.
206	I. 3		C. 3		6 v. s.
208		I. 2		I. 4	6 v. s.
233		I. 2		I. 3	5 v. s.
259	C. 3				4 v. s.
261	I. 2		I. 3		3 v. s.
262		I. 7		I. 6	4 v. s.
277					6 v. s.
291		I. 2		I. 4	7 v. s.
308		I. 3		C. 4	5 v. s.
309		I. 5		I. 6	6 v. s.
313	I. 3		I. 5		3 v. s.
314		C. 3		I. 6	6 v. s.
325					8 v. s.
342	I. 3		I. 5		6 v. s.
347	I. 1		I. 3		4 v. s.
350					3 v. s.
358	I. 1		I. 4		5 v. s.
362	I. 1		I. 3		4 v. s.
365	C. 4		C. 4		6 v. s.
367	I. 3		I. 5		6 v. s.
368			I. 3		8 v. s.
371					3 v. s.
373	C. 1				4 v. s.
388		I. 3		I. 3	4 v. s.
391	I. 1				6 v. s.
408					3 v. s.

Note: Several of the above cases show no physical signs. The diagnosis was made in some of them, from the symptoms; in others the x-ray plate furnished the evidence.

TABLE II MODERATELY ADVANCED

Case No.	Front		Back		D'Espine's Sign
	Right	Left	Right	Left	
93	I. 6	C. 4	I. 6	C. 4	6 v. s.
130	I. 1	I. 6	I. 3	C. 4	3 v. s.
140		I. 3			6 v. s.
148		C. 5		C. 5	5 v. s.
165	C. 4		C. 7		6 v. s.
168		C. 6			7 v. s.
172	I. 5	I. 3	I. 4	I. 8	3 v. s.
178	C. 4	I. 3	C. 5	I. 4	6 v. s.
181		I. 3		I. 6	6 v. s.
185	I. 3	I. 3	I. 4	I. 5	8 v. s.

TABLE II MODERATELY ADVANCED

Case No.	Front		Back		D'Espine's Sign
	Right	Left	Right	Left	
189	C. 1		C. 3		7 v. s.
194	C. 4		C. 6		5 v. s.
195	C. 2	I. 3	C. 4	I. 8	7 v. s.
197	C. 3		C. 4		4 v. s.
199	C. 3	I. 4	C. 4	I. 6	6 v. s.
211			I. 3		4 v. s.
223	C. 4		C. 4	I. 4	6 v. s.
225	C. 1		C. 6	I. 3	7 v. s.
227	C. 4		C. 3	C. 3	3 v. s.
232		I. 3		C. 3	4 v. s.
234				C. 4	7 v. s.
235	I. 2		I. 6		7 v. s.
251	C. 4		C. 5		8 v. s.
264	C. 3		C. 4	I. 3	6 v. s.
267	C. 3	I. 3	I. 3	I. 3	5 v. s.
398	C. 3	I. 4	C. 4	I. 6	5 v. s.
268	C. 1	I. 1	C. 4	I. 3	5 v. s.
270	I. 3	I. 5	I. 4	I. 4	4 v. s.
271	C. 5		C. 6	C. 3	4 v. s.
273	I. 3	I. 3	C. 4		7 v. s.
278	C. 2		C. 3	C. 6	7 v. s.
282	C. 1	I. 1	C. 4		5 v. s.
286	C. 4	I. 4	I. 8	C. 3	8 v. s.
297	C. 4	I. 4	C. 6	I. 4	6 v. s.
300	I. 3		I. 6	I. 4	6 v. s.
302	I. 3		I. 2	C. 6	7 v. s.
306		I. 6		I. 4	3 v. s.
312	I. 5		I. 2		4 v. s.
316	I. 5	C. 2	I. 4	C. 5	4 v. s.
327		I. 3		I. 5	7 v. s.
330		I. 5	I. 5	I. 6	5 v. s.
334			C. 4	I. 3	8 v. s.
351	I. 3		I. 4		4 v. s.
357		C. 4		C. 5	7 v. s.
363	I. 3	I. 3	I. 4	C. 4	7 v. s.
375	I. 3	C. 4	I. 3	C. 5	5 v. s.
378	I. 2	I. 5	I. 3		6 v. s.
384	C. 3		C. 5		6 v. s.
386		C. 4		C. 5	6 v. s.
392		C. 1		C. 3	6 v. s.
395	I. 1		I. 6		4 v. s.

TABLE III FAR ADVANCED

Case No.	Front		Back		D'Espine's Sign
	Right	Left	Right	Left	
40	C. 3	I. 6	C. 5	I. 7	7 v. s.
94	I. 3	C. 5	I. 3	C. 4	5 v. s.
98		C. 1		C. 4	6 v. s.
100	C. 3		C. 4		4 v. s.
124	C. 3	C. 4	C. 7	C. 6	6 v. s.
132	C. 3	C. 4	C. 5	C. 5	12 v. s.
135	I. 6	C. 6	C. 4	C. 6	8 v. s.
137	C. 4	C. 6	C. 5	C. 10	6 v. s.
146		I. 6		I. 10	5 v. s.
148		C. 5		C. 5	5 v. s.
153	I. 3	I. 1	I. 4	I. 3	8 v. s.
171	C. 2	C. 4	C. 5	C. 3	6 v. s.

TABLE III FAR ADVANCED

Case No.	Back		Front		D'Espine's Sign
	Right	Left	Right	Left	
183	C. 3	C. 3	C. 4	C. 4	8 v. s.
185	I. 3	C. 3	I. 4	C. 5	8 v. s.
186	I. 4		C. 4	C. 4	5 v. s.
191	C. 5	I. 4	I. 3		3 v. s.
198	C. 3	I. 6	C. 5	I. 6	6 v. s.
201	C. 3	C. 3	C. 4	C. 4	3 v. s.
202	C. 3	C. 3	C. 3	C. 6	6 v. s.
218	C. 3		C. 4		6 v. s.
220		C. 4		C. 4	7 v. s.
228	I. 3	C. 3		C. 5	7 v. s.
236	I. 1	C. 4	I. 7	C. 6	5 v. s.
237	C. 6		I. 5	C. 4	8 v. s.
241		C. 7		C. 8	8 v. s.
258	C. 3	C. 3	I. 5	I. 3	3 v. s.
265	I. 1	I. 4	I. 3	I. 5	6 v. s.
266	I. 4	C. 4	C. 4	I. 6	7 v. s.
269	C. 4	I. 4	C. 3	I. 6	4 v. s.
272	I. 5	C. 2	I. 3		4 v. s.
281	C. 3	C. 4	C. 7		12 v. s.
285	C. 2	C. 2	C. 4	C. 3	7 v. s.
288	C. 1	C. 2	I. 3	C. 4	9 v. s.
289		C. 5	C. 3	C. 5	6 v. s.
324		C. 3		C. 4	4 v. s.
329	C. 3	I. 2	C. 5	I. 3	7 v. s.
333	C. 3	C. 5	C. 5	C. 4	6 v. s.
336	C. 4	C. 3	C. 3	C. 3	4 v. s.
337	C. 3	C. 3	C. 4	C. 3	6 v. s.
338	C. 2		C. 3		7 v. s.
341	I. 3	I. 4	I. 2	I. 8	5 v. s.
344	C. 3		C. 3	I. 4	8 v. s.
354	C. 2	I. 1	C. 5	I. 3	6 v. s.
366	C. 3		C. 4		5 v. s.
374	I. 4	C. 3	I. 5		5 v. s.
395	I. 1	I. below 5	C. 5	I. 6	4 v. s.
401	C. 3	C. 3	C. 3	C. 4	3 v. s.
403	C. 3	C. 4	C. 5	C. 4	7 v. s.
409	I. 5	C. 4	I. 4	C. 6	6 v. s.
410	C. 3	C. 4	C. 4	C. 6	6 v. s.

TABLE IV GLANDULAR CASES

Case No.	Character of Lesion	D'Espine's Sign	Case No.	Character of Lesion	D'Espine's Sign
36	glandular	3 v. s.	157	glandular	5 v. s.
44	"	4 v. s.	174	"	2 v. s.
69	"	4 v. s.	182	"	3 v. s.
81	"	5 v. s.	192	"	5 v. s.
82	"	4 v. s.	200	"	3 v. s.
91	"	6 v. s.	203	"	4 v. s.
92	"	4 v. s.	205	"	8 v. s.
102	"	4 v. s.	238	"	6 v. s.
119	"	5 v. s.	239	"	5 v. s.
123	"	4 v. s.	260	"	4 v. s.
125	"	4 v. s.	275	"	2 v. s.
127	"	5 v. s.	279	"	4 v. s.
131	"	3 v. s.	280	"	4 v. s.
143	"	4 v. s.	283	"	8 v. s.
147	"	3 v. s.	299	"	5 v. s.

TABLE IV GLANDULAR CASES

Case No.	Character of Lesion	D'Espine's Sign	Case No.	Character of Lesion	D'Espine's Sign
328	glandular	3 v. s.	385	glandular	4 v. s.
349	"	3 v. s.	396	"	7 v. s.
370	"	5 v. s.	405	"	5 v. s.
383	"	10 v. s.			

D'Espine's sign was heard below the seventh dorsal vertebral spine, 10 were far advanced, 4 moderately advanced, 3 incipient, and 2 glandular. Of the 54 cases in which the sign was elicited below the fifth vertebral spine, 23 were far advanced, 26 were moderately advanced, 12 were incipient, and 3 were glandular. D'Espine's sign was heard lower than normally, i.e., below the fourth dorsal vertebral spine, in over 50 per cent. of the incipient cases, in 76 per cent. of the moderately advanced cases, and in 80 per cent. of the far advanced cases. It is a significant fact that the sign is present so frequently in incipient cases.

All of the glandular cases cited, occurred in children. Therefore, a D'Espine's sign heard below the 7th cervical vertebra was considered abnormal. All of the cases, in this series, showed D'Espine's sign below the first dorsal vertebral spine, and in the majority of the cases it was heard below the third dorsal vertebral spine. A few notes regarding some of the cases seen may be of interest. All pupil nurses at Nopeming Sanatorium are given a chest examination. In one case D'Espine's sign was heard to the 8th dorsal vertebral spine, and no other evidence of tuberculosis was found. On inquiry into the history of the case, it was learned that the mother had died of tuberculosis when the nurse was four years old.

Another nurse showed dulness at the left lower base, and bronchial breathing over the same area. D'Espine's sign extended to the 8th vertebral spine. An x-ray picture failed to show any tuberculous process. Tubercle bacilli were not found although the sputum was examined several times. It is probable that this was a case of bronchiectasis.

A young man, a high school student, after an attack of acute pleurisy, presented the signs of incipient tuberculosis in the right lung. There were a few fine râles at the apex, with slight dulness and deficient breath sounds. The dulness and deficient breath sounds were more marked at the base. After three months' stay at a sanatorium the signs completely cleared up. D'Espine's sign was, however, present to the sixth dorsal vertebral spine, and was still present a year later. A skiagraph showed the presence of enlarged bronchial glands.

On the other hand, a recent patient showed consolidation of the right upper lobe, and yet D'Espine's sign was not heard below the seventh cervical vertebral spine.

The above cases show that D'Espine's sign is not always present in pulmonary tuberculosis, nor when present, does it always mean that it is due to a tuberculous process. The question whether the production of

D'Espine's sign in pulmonary tuberculosis is usually due to enlarged glands, to transmission of the voice through consolidated lung areas, or possibly dilated bronchi is interesting, but not within the scope of the present paper.

In conclusion, it may be stated that D'Espine's sign is very frequently present in all stages of pulmonary tuberculosis, and in enlargement of the bronchial glands. The location of the sign seems to bear no constant relation to the amount of pulmonary involvement. It is a very easy sign to elicit, except in the very emaciated, and while it is by no means always present, it is nevertheless of considerable value as corroborative evidence of incipient tuberculosis taken in conjunction with other physical findings and symptoms. Any sign that will aid the physician in the early diagnosis of tuberculosis is certainly of value.

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THE USE OF THE X-RAY IN THE DIAGNOSIS AND STUDY OF PULMONARY TUBERCULOSIS

By Charles L. Minor, M.D.

Asheville

Though there has been a great deal written on the use of the x-ray in the Diagnosis of Pulmonary Tuberculosis, the profession as a whole, and even the specialists, are still unagreed as to how to estimate the value of this new diagnostic measure. The mastery of it is a matter of so much time and special experience and the instrumentarium is so elaborate and costly that for a long time it was not used by clinicians in studying pulmonary tuberculosis, save in a few instances, while the radiographers who used it were usually men not especially familiar with the early diagnosis of pulmonary tuberculosis by the usual clinical methods. Hence the clinician was apt to underestimate its value while the radiographer made claims for its superiority over physical diagnostic methods which would not have been so sweeping had he been more familiar with the requirements of the physical examination of the lungs naturally.

However, we now find a number of physicians who use the x-ray themselves as part of the routine of their examination, while the radiographer, having closer connection with the clinician, and in some cases having controlled his work by autopsies, understands pulmonary tuberculosis better and makes less exaggerated claims as to its diagnostic value.

I desire to speak to you to-day on the clinical aspects of the application of the x-ray to the study of pulmonary tuberculosis, having used it in this way now for some eighteen years, and having formed some very definite conclusions as to its value, both as a means of early diagnosis and also of what I would call "Topographical Diagnosis." Between these two I would make a sharp distinction.

Used in the first way, we can study its value as revealing very early changes and can discuss the question as to whether the older methods can rival it as a revealer of very incipient lesions.

Used in the second way it is a means of showing to us the geography of the lesions in the lung; a means of getting some idea of the true extent of the process which is going on, its advances and its retrogressions, and also as a means of aiding us in forming a prognosis. Unlike most men in the United States I have systematically used the fluoroscope rather than the radiograph in my work, and am satisfied that for the large majority of such work, it is distinctly superior, and I think it is only in the minority of cases that the finer definition, and what I would call the confusing detail given by the plate, is essential to a diag-

nosis; and I believe that the broader, more sketchy picture given by the screen is the more generally useful. This view while not common in this country, is one very commonly held in Europe.

This is not the place to enter into the discussion of the relative value of these two modes of using the x-ray. Suffice it to say that I have convinced myself by many years' experience that the fluoroscope is the better instrument for the physician for the study of the large majority of his pulmonary cases, and that the number of cases in which a stereoscopic plate is important in reaching a diagnosis, is so small as to make it unnecessary for him to burden himself with the extra amount of elaborate outfit and work necessitated by photography.

With this explanation, let me turn to a consideration of the value of the x-ray as a means of diagnosis in the study of our cases of pulmonary tuberculosis. We have had for nearly a century now, largely thanks to the great Laennec, a well thought-out and tested routine for studying the physical condition of the lungs in these cases, and the profession are more or less familiar with its value and possibilities, though it is true that many of us are apt to forget that not the best physical examination alone can make a diagnosis. This, it cannot too often be reiterated, can only come from a proper study of the facts yielded by such an examination combined with a well taken history and a faithful study of the clinical course of the case for some days at least; the latter two being just as important as the former and very often more so.

From time to time this systematic routine laid down by the masters, has had added to it certain refinements and new procedures; but none of these, save the discovery of the bacillus by Koch, have been as important or as fruitful of results as the use of the x-ray. While it cannot be considered as an essential to a diagnosis, it is of such importance that *it should be available to all men making a special study of pulmonary diseases.* The results are so striking that at first radiographers tended to claim too much for it and seemed to anticipate a time when it would supersede other methods of examination. However, from the first, many of the best radiographers have clearly recognized its limitations. Holzknecht dwelt on this as long ago as 1901, in his classic work; and Arnsperger stated it well when he said in 1910, "The x-ray examination is only an adjunct, though truly a very valuable adjunct, for the discovery of the tuberculous focus in the lung, but it does not render superfluous other diagnostic measures." (Page 149.)

However useful the x-ray is to the clinician the stethoscope will remain the chief instrument of pulmonary diagnosis, not merely because of its simplicity, which the x-ray can never rival, but because it gives us a better idea of the activity and nature, though not of the extent of the process. One difficulty with generalizing the use of the x-ray among the profession has been the fact that the apparatus is elaborate, costly and demands more room than most doctors have at their disposal, and more time for developing and studying the photographic plates than many men could hope to devote to it. Indeed, to produce and develop

a really good plate is a difficult matter; and to-day in this country I find that many of the plates I see taken by men who are not professional radiographers are so poor as to be of little value, and will mislead rather than enlighten those who study them. This difficulty is escaped by the fluoroscopist, as it is not nearly as difficult to master the question of proper current, penetration, etc., which affects the picture on the screen, while the lesser amount of the fine details, a large part of which are normal shadows, makes the interpretation of the more boldly sketched-in picture on the screen far easier.

Further, the doctor has the great advantage of seeing his patient's chest at once while he is making the rest of his examination, instead of waiting until such time as the plates are developed and ready for study, to complete his synthesis of the findings.

When the lung specialist has to send his patient to the x-ray specialist for photography there occurs an awkward break in the diagnostic chain, when one man hands on to another verbally the information he has gathered, which the second must try to fit into his diagnostic picture, yet no man who is not constantly active in the subject will be able satisfactorily to read the plate, one of the most difficult parts of the whole procedure, hence he is dependent on the radiographer's interpretation.

While the x-ray specialist is with us to stay, and while the general practitioner will never need to run his own x-ray outfit for such x-ray work as he has, more and more the lung specialists of the country, for the reasons above noted, are putting in their own outfits, are learning to interpret the screen, or the plate, as it may be, for themselves, and this should have an excellent effect in widening our knowledge of the lung picture in pulmonary tuberculosis, as the lung specialist will see many more cases of tuberculosis than would the busiest x-ray man and his knowledge of the pathology and nature of the disease will enable him to draw from them the maximum of value.

I cannot stress too insistently the importance of the clinician being at the same time, if possible, the x-ray man, and I trust that before very long every lung specialist will feel the necessity of such an outfit in his office, and personally I believe that it will be distinctly desirable if he should confine himself to the use of the fluoroscope and have photographs taken by the radiologists in those rare cases only where the difficulty of the case is unusual. Indeed it is superfluous and a needless expense to have an expensive pair of stereoscopic plates taken in every case while the fluoroscope is always instantly available with no extra expense of time or money.

I have already indicated that there are two aspects from which we must consider the use of the x-ray in lung work. First, as a means of early diagnosis. Second, as a means of topographical diagnosis.

Our regular means of diagnosis are so excellent, and the vast majority of cases can be so well diagnosed with the regular methods, that the diagnostic use of the ray is much less important than its topographic use; that is, its use in giving us a knowledge of the distribution and physical

configuration of the disease, which is so extremely valuable in treatment, but nevertheless the first question that is put to us by those unfamiliar with this method is, "Is it capable of making a diagnosis in cases in which we cannot arrive at a diagnosis by a history, a physical examination and clinical study?"

I believe, save in exceptional cases, that the x-ray is not essential for a satisfactory early diagnosis. True, there are *certain* cases where the x-ray gives us our first information, and others where it corroborates what otherwise is only a suspicion; but as often we meet cases which are clearly positive to physical examination, where the x-ray is negative, and with such positive physical findings which we cannot neglect, we can afford to neglect the negative findings of the x-ray.

As Holzknecht says, the few conglomerate tubercles with accompanying catarrh of a really anatomically incipient case escape the plate.

Ziegler and Krause (page 9) note "A beginning tuberculosis in the apex can either show itself in the form of a catarrh or as a so-called closed tuberculosis with a small deposit of tubercles, which lie either scattered or close together, and cause an infiltration of the surrounding tissue. In the first case auscultation, and even percussion, will surpass the plate, since a fine catarrh, if it does not result in a marked decrease in the air content of the tissues, gives no shadow. If there is a marked decrease of the air content on account of this catarrh, one can expect an even clouding of the apex. Many isolated or conglomerate tubercles in infiltrated lung tissue show on the plate, and in this case the photograph will most powerfully back up a lung finding, which, with closed foci, is often not certain."

The same authors (page 7) have shown that a mass to be seen must be four cubic millimeters in size, and near to the plate, and that even larger pieces on the side away from the plate can only be seen where their place is known and carefully sought for. They also found that caseous matter, scar tissue or masses of miliary tubercle all produced similar shadows if the masses were small; though if the masses were large, caseous matter gave a deeper shadow.

Dr. Dunn who has had large experience with the stereoradiograph believes, however, that this will not apply to such plates, but only to direct photographs, in which view, from a study of his plates, I would concur, although these observations of Ziegler and Krause give us valuable data by which to estimate the penetrative ability of the x-ray.

Coming to the question of early diagnosis by this method, what changes will we find from the normal lung picture in cases of incipient tuberculosis? These changes are of four kinds: *First*, apical shadows; *second*, apical shrinkage; *third*, hilus shadows, and bands connecting these with the apex; *fourth*, limitation of motion of the base, or Williams sign; *finally*, filmy bands of infiltration, running outward from the hilus to the outer border of the lung field, at the second or third rib, though these last are not strictly speaking incipient changes.

Apical shadings are of two sorts: A diffused clouding, due either to

apical pleurisy, or to a diminution of air content in the apex from the pressure of fine tubercles on the finest air passages; and, secondly, isolated small foci, due to a deposit of conglomerate tubercles. Such shadows are easily seen with a good fluoroscopic apparatus, and Arnsperger asserts that the fluoroscope can be just as useful in the diagnosis of these earliest changes as the plate, the latter *merely serving to give some of the finer details of the picture.* (Italics mine.)

As I am not dealing with technique, I need not dwell on the care which must be exerted to avoid mistaking rib crossings for apical shadows. Such shadows as I have referred to have a great diagnostic value, but it cannot be too insistently noted that the x-ray is only one of various methods of observation, and only shows us, as Holzknecht long ago said, areas of condensation, and cannot tell us without the use of all the other means at our disposal, what this condensation stands for.

Further, I would repeat that absence of apical shadows in the presence of distinct physical signs cannot nullify the latter, while, on the other hand, shadows in this region unaccompanied by adequate physical signs or symptoms, probably speak for old healed foci rather than for active trouble, though, of course, *they must be watched carefully.*

In a certain number of cases, while there is no shadow over the apex, it will be distinctly shrunken as compared to its presumably normal neighbor; but great care has to be taken to exclude those changes of apical size brought about by scoliosis, etc.

The failure of an apex to become clearer, as compared to the other, on deep breath, is considered a valuable sign by many. I have not found it so.

One of the great services which the x-ray has rendered the study of tuberculosis is the demonstration that the process does usually not begin in the apex, where the first physical signs are found, but in the glands around the roots of the lungs, where incipient changes cannot be revealed by auscultation and percussion at all until a later stage of enlargement.

As soon as one begins to use the x-ray one is struck with the great frequency of shadows of tracheo bronchial adenopathy, and of infiltration along the lymphatics passing from the root upwards toward the apex. These, which are often found in children, have been studied in an admirable monograph by Kohler. It does not do to assume that all shadows in this region are necessarily due to tuberculous glands, but the frequent presence of small foci of shadow in these regions in cases of tuberculosis, and their rarity in apparently normal individuals, justifies us in believing that they are of tuberculous origin, and while not enough by themselves to mark the case as tuberculous, they would have great corroborative value.

Kohler quotes Friedrich Kraus on the subject as follows: "Bronchial gland shadows are one of the most reliable findings in early tuberculosis. In clinically diagnosticable apex catarrh one can find swelled, single or conglomerate lymph glands around the hilus not otherwise discoverable."

Then, we have Williams sign, a decrease in descent of the diaphragm on inspiration. I have studied this sign carefully for many years and would consider it valuable if we did not have at our disposal what I believe to be a more valuable method of determining such lessened expansion; that is, the marking out of the base of the lung, front and back, first while at rest, and then after deep inspiration. Very early in the disease, while there is still only a small involvement in the apex, the effect upon the function of the lung of such a focus is such that there will be a distinct limitation of motion on the newly affected side, so that we can often in bilateral trouble judge which side is the new one, and this will show itself sooner than that shrinkage of the apex called "Kronig's sign." I do not refer, of course, to those coarser changes produced by pleuritic adhesions, fibroid processes, etc. Such a limitation will appear very early in the incipiency of the trouble, before percussion changes are present, and I have come to consider it a very reliable early sign, and, as I am able to demonstrate it and record it with greater accuracy than by the x-ray, this sign has lost for me somewhat of its value, although I always record it in my findings.

Finally as to the radiating branches extending from the hilus outward and upward toward the periphery of the lung field below the outer end of the clavicle; these have been dwelt on especially by Dunham as our best early signs, but while no man can have used the x-ray long and not have observed them, in my experience apical shadows are earlier. Later the area enclosed by these bands becomes infiltrated and dark and then we have a triangular shadow with apex at the second or third ribs at the sternum and base, at the outer portion of the field and it is along the lower border of this triangle that we so often see the sharper dark shadows referred to later, which are given by fibrosis.

Such are the changes which we should look for in an incipient case, and that they can be of great assistance in reaching a diagnosis is very evident. However, after many years of the combined use of both methods, primarily as a clinician and physical diagnostician, and secondarily as a fluoroscopist, I am convinced that the regular methods of physical diagnosis, especially inspection, percussion and auscultation, *skilfully* applied (and to be useful they should be applied in no other way) will lead us to a correct diagnosis in the great majority of the cases more surely than the facts which we derive from the x-ray, although these are of great corroborative value.

No one who has worked with these procedures, but has found cases in which the physical signs were uncertain, or almost negative, where only by the aid of the x-ray could we reach a diagnosis; again others where auscultation, percussion and inspection gave us indubitable evidence of beginning trouble when the x-ray would have left us in the lurch. In all very doubtful cases, therefore, where a diagnosis is not quite possible, the use of the x-ray is important and should be encouraged, granted that the technique is perfect and that the older, and, as I believe, more valuable methods are not slurred.

But it would be most unfortunate if the general practitioner should learn to trust too much to the x-ray for his early diagnoses, especially if, with inadequate apparatus, technique and experience, he makes his own plates. Just as no sensible physician would think of making a diagnosis from percussion alone, so we must regard the x-ray as merely one of various methods for gathering facts whose careful synthesis will bring us to a correct conclusion.

When I take up the other use of the x-ray in the study of pulmonary tuberculosis, its use as a means of what I call "Geographic Diagnosis," I cannot say too much in commendation of its value. When one has examined lungs for years and has sought to create in his mind a picture of the geography of the pathological process in any given chest, and finds how hard this is, when he takes up the use of the x-ray and by systematic and not occasional use (for occasional use will never teach us to understand the picture), has mastered its interpretation, which is not an easy matter, he will have thrown on the subject a flood of light which will almost dazzle him, and he will never again be content to be without the pictorial assistance given him by the fluoroscope or the radiograph, and preferably the former, both because it can show him motion, because he can examine the lung obliquely in all directions, can repeat the examination at a moment's notice at any time, and is free from the confusion wrought by the many fine details, of uncertain interpretation even to the best men, which the plates show.

No matter how carefully and how often one may percuss and auscultate the patient's lungs, the idea that one thus gets of the extent and peculiar shape of the lesions is incomplete; whereas when one looks at a sufficiently large (12–16 in. or 16–20 in.) and properly illuminated screen, or a pair of stereoscopic plates, these matters can be settled with wonderful clarity. Indeed, in the study of abscess, of cavities, of bronchiectases, of pneumothorax, of hydro and pyothorax, of interlobar pleurisies, it is not merely useful, it is essential, to a complete understanding of the case, such as the specialist demands.

Many years of practice have taught me to reverence deeply the masters of physical diagnosis, Laënnec, Walsh, Grancher, Flint, Skoda, and many others; their work is a permanent addition to the splendid achievements of medicine; but when the x-ray shows you how possible it is to entirely overlook the presence of a considerable cavity or even a pneumothorax, which the screen shows up without possibility of doubt; or to pass over an abscess, or to fail to find fluid in a pleural sinus, or to discover an interlobar pleurisy, all of which are revealed by the x-ray, it produces in us a healthy humility which is good for the soul if not for the pride.

At the same time it is distinctly unwise to do as some radiographers try to do, and label each shadow too positively with the name of a definite pathological process, just as we would at an autopsy when the thorax lies open before us. After all we see only shadows, and while they can suggest to us by what they are made, various things can give shadows that cannot be possibly distinguished one from the other, and

too great a certainty in naming what we see is, therefore, unwise and creates a false security.

Let us consider then what we know of the pathological processes which cast shadows, and how much we can really see with the x-ray. While some enthusiasts have claimed that simple congestion of the lungs can be seen on the plate, the great body of careful workers will deny this.

Again, catarrhal processes will not show and cellular infiltration must be very marked before it gives any shadows, unless, by cutting off the air supply to the part, it causes shading. Ordinary dry pleurisy, in its active stage, gives no shadows at all, and indeed in chronic cases the membrane must thicken considerably before it begins to give us that even diffused, ground glass shading over large areas, which we recognize as usually caused by old, thick, dry pleurisies. In a very old pleurisy the shadow can become densely black, but this is probably not all due to the thickened pleura, but partly to the shrunken lung which always underlies such a change in the membrane.

Caseation, masses of tubercle, and fibrosis each give shadows, though, as noted, Arnsperger found that caseation, if the mass is large enough, gave the darker shadow.

Calcification gives a very dense black shadow, and such shadows are seen most commonly, of course, in the glands around the roots of the lungs; slightly enlarged lymphatic glands do not by any means always give shading. As the process in them gets older, the shadows get more and more pronounced.

Adhesions, if they are between the lung and the diaphragm, may show clearly, and at times we will see the diaphragm drawn up into a point thereby. But if the adhesions are from the lungs to the chest wall they will only be seen as patches of thickened pleura. Were this not so, the x-ray examination would be of even greater use in deciding beforehand whether a lung could be collapsed successfully or not. Effusions of an amount far too small to be determined by the best physical diagnosis, can be revealed easily by the fluoroscope, by turning the patient at such angles as to show us the bottom of his pleural sinus, a thing which cannot be done satisfactorily on the plate. When emphysema is marked, it shows out very clearly as an undue clearness of the lung picture, but I doubt if small patches of localized emphysema could be certainly determined.

A wonderful advantage of the ray is in revealing to us otherwise undeterminable deep-seated foci which escape our other measures of examination; such foci will sometimes appear deep in a large area of otherwise normal lung, and I have found them especially common outside of the heart shadow on the left, near the border of the field. Again, interlobar pleurisies are shown by the x-ray when they cannot be otherwise demonstrated, and the ability which we have in fluoroscopy of examining the patient at different angles before the screen enables us to get a very clear idea of their extent and direction, as in certain angles the linear shadows thrown by the effusions will almost disappear, and in

others stand out sharply. On the single plate they do not show so well, but the stereoscopic plate shows them excellently.

In the study of abscess it far surpasses any other measure and will also usually reveal small unsuspected pneumothoraces clearly. At times bronchiectases will be shown very clearly as rosary-like enlargements strung along the course of a descending bronchus or as isolated globular or fusiform shadows; but more often they cannot be satisfactorily seen and it is safer to rely largely on the history and the classical symptoms than to trust to physical diagnosis or the x-ray alone. Fine miliary tubercles cannot, I believe, be seen, though some have claimed the contrary, and to pick out small spots on a plate and declare that these are miliary tubercles is a risky procedure. When, however, they are more numerous they can by combination create a diffuse cloud-like shading; or, when they are somewhat larger and scattered, one can see a stippling or fine mottling of quite marked degree all over the lung. However, this is not the stage of the trouble when we need assistance, and in the stage when we do, when the process is just beginning, it cannot help us. It should be noted that the crossings of bronchi and vessels may give the appearance of isolated tubercles.

The shadow picture of a moderately advanced case can show various arrangements; usually in moderately active cases the area of shadow is triangular with the apex at the sternum at the second or third ribs and the base at the periphery; but it is rare, even in advanced cases, that we see a uniformly darkened field unless we have an old, very thickened pleura, the picture usually being a mottled one with dark masses in the midst of a clear, or partly clouded, ground. As fibrosis advances in a favorable case, it can usually be seen as more or less clearly marked linear shadows, here and there; but the place where fibrosis shows most clearly and unmistakably is on the border between an involved apex and the rest of the healthy lung. Here we will find very sharply defined black sickle-like, concave shadows, usually running from the outer end of the clavicle downward and inward to the sternum, somewhere about the second, third or fourth ribs, the edge being very sharp, the lung below being very clear, and the shadow above the edge usually dense, but, sometimes, mottled. Such sharply outlined shadows, long experience and clinical study of the cases with the constant control of the fluoroscope has shown me, occur almost uniformly in favorable healing cases.

On the contrary, diffused light gray mottled shadows with no sharp outlines speak for a much more active and advancing process. This is very beautifully shown sometimes when, in a lung in which there is such a well scarred down, clearly defined shadow of fibrosis shutting off the process from the rest of the lung, a new activity arises. In this case outside of the old scar wall we will see mottled, hazy clouds of new trouble, developing outside the now useless rampart.

I know that it is the fashion to-day to say that it is impossible to distinguish between the shadows of fibroid trouble and of more active

trouble, but eighteen years' study of the matter has convinced me beyond peradventure of a doubt that such a distinction can be made; that dark, sharply defined shadows go with healed, or healing processes, and that cloudy masses floating over the lung picture, like a sea fog blowing over the land, are uniformly connected with advancing and active trouble.

Holzknecht takes this view in the following words: "We have here to distinguish between the sharply bordered, intensely dark shadows and those with indefinite, cloudy, not linear, but gradually fading away borders. The first represent, as autopsies have often shown, old foci of infiltration in which the general tendency of healing tuberculosis towards fibroid processes has occurred, the last represent fresh advancing foci"; and although many men now take a different view, I feel very sure that this is the correct attitude.

No process in this disease has had more light thrown upon it than cavitation. We all know how often in the old days autopsies would reveal cavities which we had not suspected, and now again we find how commonly the x-ray will reveal to us cavities which physical diagnosis cannot demonstrate. True, at times we will see large cavities, easily discovered by physical diagnosis, which can entirely escape us on the screen, owing to their being surrounded by dense tissue; but this is unusual, whereas the discovery of cavities that we had not found by physical diagnosis is an everyday matter.

The cavity with a marked fibroid wall is very easy to recognize as a bright circular or oval area surrounded by a dark wall of scar, especially if there be fluid in it in which we can demonstrate motion. Other cavities whose walls are not so marked are sometimes difficult to tell from areas of healthy lung in the midst of diseased tissue, and here we have to depend upon observing whether there are any evidences of lung markings in the bright area. If there are not, even if it has not got very marked borders, it is a cavity; if there are, we can exclude it.

It is scarcely necessary to refer to the great assistance the x-ray has given us in the study of artificial pneumothorax. Indeed, I can safely say that no man is justified in carrying out this procedure without the assistance of the x-ray.

In conclusion, it seems to me that the work of the past years has demonstrated that in the x-ray we have an invaluable addition to the physical examination of the lungs in pulmonary tuberculosis both for early diagnosis and for topographic study.

Like each of the usual procedures, it cannot by itself make a positive diagnosis and can never justify us in slurring a careful history or a thorough clinical study of the symptoms, and it would be a misfortune if the profession came to regard it as the last and safest arbiter as to the presence or absence of tubercle in the lungs. Many of the best radiographers have dwelt on this. Kohler (42) stresses the fact that the x-ray examination has no superiority over the classic examination measures, and says "To whatever completeness the x-ray examination may come, the regular measures must be used in every case."

Arnsperger (14) says. "The x-ray is only an aid, truly a very valuable aid, in the study of the tuberculous process, but it does not render unnecessary the use of the other diagnostic methods and especially the clinical study of the case."

Holzknecht (112) says, "The x-ray examination of the lungs is not an exact diagnostic method, but it is a support and completion of the other clinical methods, sometimes agreeing, sometimes better, sometimes not so good." Ziegler and Krause (pp. 8–9) say: "It would be useless to compare radiography with auscultation and percussion to decide which method was best for the discovery of the finest tuberculous changes. This would lead to no result. Either method can under conditions be the best, a union of them all will strengthen the diagnosis."

Wollman speaks of it as "giving additional information."

If, however, it is so valuable, it is evident that it is the duty of every doctor who concerns himself especially with diseases of the lungs to familiarize himself with its use and to add it to the procedures he uses in the diagnosis of his cases. For the reasons I have already given, I venture to say that in the majority of cases a satisfactory fluoroscopic apparatus will best meet his needs, but if he has time to install and use systematically both this and a powerful radiographic outfit and to run a photographic studio, and to learn to take and interpret first class stereoscopic plates, it will unquestionably increase his knowledge of his cases.

Only when the clinician shall *himself* use the x-ray in his every day office work *and on every case* will he get that mastery of it which is essential if it is to guide and not to mislead him; and if he is to derive from it the assistance it is capable of giving and only when the clinician so masters it, instead of trusting to another man's report of what this other man has seen, will we finally be able to settle many of the yet unsettled points which await solution.

SUMMARY

1. The solution of the question of the exact diagnostic value of the x-ray is not yet possible.

2. The final solution will come from the combined use of the x-ray with our regular methods and a control of the results by autopsy.

3. Therefore, it demands that the clinician do his own x-ray work.

4. Meantime in a few difficult cases the stereoscopic plate is needed for a final diagnosis.

5. In the great majority of cases the fluoroscope is clinically the best instrument and will give us the most aid.

6. When plates are used they should always and only be stereoscopic.

THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS BY X-RAYS

THE ROENTGENOLOGICAL ASPECT

By Frederick H. Baetjer, M.D.

Baltimore

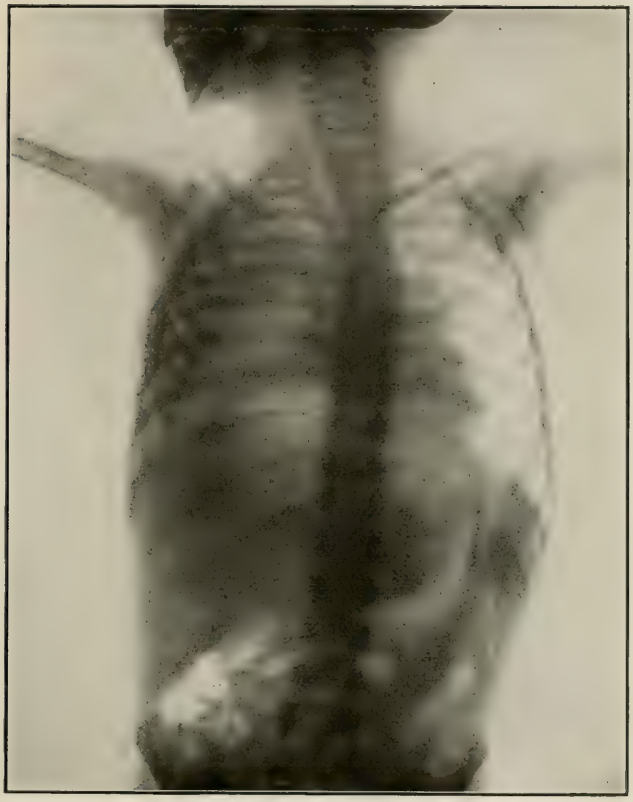
Before taking up the pathological condition of lungs, let us for a few moments glance at the roentgenogram of a normal lung. This varies according to the age of the individual. The normal changes that we see are dependent upon the changes in the bronchial tree. By the bronchial tree we mean the branching of the bronchus and its attendant vessels. The large bronchi being at the root of the lung and the finer sub-divisions at the periphery.

This bronchial tree is composed of the bronchus, artery, vein and lymph channel, all taken together form the shadow which we see in the roentgenogram. Of these four, probably the artery casts the most definite shadow, but as Boardman and Dunham have shown, it is the sum total of these four which cast the shadow and that if one takes a lung and dissects out each one that none of them casts a particular shadow, but it is the collection as a whole that gives us the bronchial tree.

For the sake of convenience we divide the lung arbitrally into three divisions. The first division from the sternum to a line drawn about one inch beyond the sternal border and running down the chest, which we speak of as the first zone. This takes in the edge of the mediastinum and the roots of the lungs. Zone 2 extends from that line to the mammillary line. This comprises the central zone of the lungs. Zone 3 is that portion outside of the mammillary line extending to the periphery.

In normal individuals up to thirty years of age where there has been no infection the bronchial tree can be traced distinctly through Zones 1 and 2; Zone 3 as a rule being free from the tree. This is due to the fact that the sub-divisions are so fine and the fibrous sheath around them so slight that it is not sufficient to cast a shadow. Beyond thirty and especially so in old age the chronic infections such as bronchitis, influenza and pneumococci infections, have caused a certain amount of inflammatory changes in the bronchi so that the entire tree as it were becomes thickened and in such cases can be traced completely to the periphery. This, however, may have no pathological meaning.

Therefore, in an examination of an individual we have to determine what is normal for that individual. In other words, we must know his age and then picture to ourselves what changes would take place for that age. For example: — the lung of a man of seventy might be perfectly



ROENTGENOGRAM NO. I.
Taken November 18, 1915, before treatment was instituted.

normal when his age is taken into consideration. On the other hand if we got the identical roentgenogram in a man of twenty it would be a pathological condition. We must bear in mind that the changes we see in a lung are the result of substances of sufficient density so that they cast a shadow. Our roentgenograms in other words are shadow pictures so that lesions of different etiological origin, provided they have the same density, will cast the same shadow.

If a gold dollar, a silver dollar and a penny were all of the same size and thickness and a roentgenogram was made, they would all cast the same degree of shadow and we could not differentiate the shadows cast by one from the other two. The same condition presents itself to us in the examination of the lung.

Of course, the thing that is of the greatest interest to us is the question as to whether we can determine the presence of tuberculous changes or not. This method of examination to be of any value must be able to recognize slight changes early and we must be able to say absolutely that this is a tuberculous lesion or not. From our own studies we feel that in incipient tuberculosis we are not able to determine the etiological factor. It is perfectly true that we can detect very early permanent changes much earlier than the clinician, but unfortunately we do not believe that we can determine the etiological factor. It is also true that when tuberculosis has made any considerable advance in the lungs that a certain point is reached and the character of the changes in the lung are such that we can definitely say that this is a tuberculous lesion irrespective of what the clinical diagnosis may be. Unfortunately, however, when this stage is reached the question of a diagnosis from a roentgenological standpoint is not necessary, as all the signs and symptoms of the disease are so apparent from the clinical side.

It seems to us that the term incipient tuberculosis is a misleading one because that term is used in a different way by so many clinicians.

A short time ago it fell to my lot to listen to a paper on pulmonary tuberculosis by a well-known roentgenologist which dealt with incipient tuberculosis. All the plates shown indicated more or less consolidation varying from a small bit in the apex to practically half of the upper lobe. According to our method of classification there was no need for a roentgenological examination to determine the diagnosis as the disease had advanced to a point where there could be no question as to the diagnosis clinically. To my mind incipient tuberculosis from a roentgenological standpoint is characterized by the very slight changes. The bronchial tree has become a little bit thickened, there may be slight irregularities on it as if local deposits had taken place, there are no areas of consolidation, the alveolar spaces are clear, there may be a slight flattening of the apex, clinically there may be a few râles and there may be a slight diminution in the breath sounds. It is just in this type of cases that it is so important to make an etiological diagnosis. There may not be sufficient clinical evidence and physical signs to make an etiological diagnosis and unfortunately, while the roentgenogram may show us definite changes in a certain

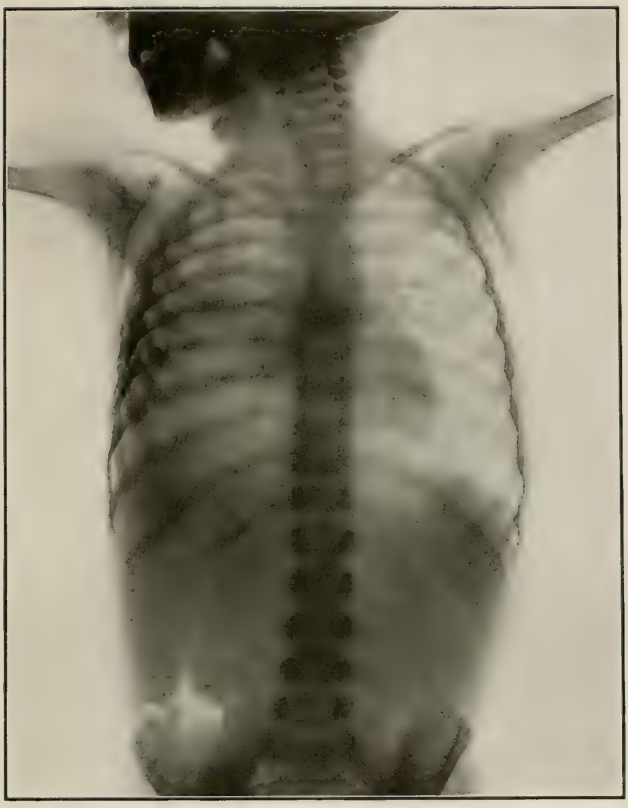
area yet at this very early stage there is nothing pathognomonic of tuberculosis and it seems to us that we can only point out the changes and not attempt to make an etiological diagnosis.

In a series of fifty cases of normal individuals in which a careful clinical examination was made and also a careful roentgenological examination, we found variations in practically all of them. These variations consisted of slight changes in auscultation and percussion, and also slight changes in the roentgenogram evidenced by a slight clouding of the apex just above the clavicle and possibly a slight increase in the markings of the bronchial tree. In two of the cases only were we able to establish definitely that the condition was probably tuberculous. We do not mean tuberculous from a clinical standpoint but changes which have come from tuberculosis.

Now we know that from our autopsy findings that if all lungs are examined we find some trace of tuberculosis in them. Consequently, these little definite changes which are seen in the roentgenogram and which we say are tuberculous do not necessarily mean that we are dealing with an active process but may be the result of an old infection years before. Consequently, we can truthfully say, since every lung has practically some tuberculosis in it that we have changes in the lung which are tuberculous but the important point is whether this change is clinical tuberculosis or not. We must make a distinction between roentgenogram tuberculosis and clinical tuberculosis. By roentgenogram tuberculosis we mean a roentgenogram which shows certain definite changes which we can say are of a tuberculous origin. We do not know, however, whether this is an active or an inactive process or a healed process. By clinical tuberculosis we mean one of signs and symptoms and the general physical condition of the patient. These two by no means agree. We frequently see cases where the roentgenogram gives us very marked changes yet the patient to all intents and purposes is quite well. On the other hand there may be cases with very slight roentgen signs and yet decided changes from the clinical and physical standpoint.

We have just spoken of the fact that changes we see in the roentgenogram are due to small shadow casting substances in the lungs and these shadow casting substances are generally either of a fibrous or calcified nature. In infections of the lungs of whatever character, the infection is along the course of the air passages. These become inflamed and as in all inflammatory conditions they produce re-action, consequently, the fibrous sheath which surrounds the bronchi, artery, vein and lymph channels becomes thickened. This we see so frequently in chronic bronchitis and in influenza, and in the very early stages of tuberculosis the same picture can be seen, that is before the infection becomes wide-spread and gets out into the alveolar tissues.

Of course, it is a much disputed question as to whether tuberculous infection is spread through the air passages, the blood or the lymph. The fact that the lymph flows towards the mediastinum rather means that if the infection is carried by that agent it would have to be against and not with the current. On the other hand it seems more logical to think that



ROENTGENOGRAM NO. II.
Taken January 4, 1916, after 43 days of Iodine Medication.

the infection is transmitted either by means of the blood or more likely by the air-passages. For a method of diagnosis, however, this does not mean any material change as far as distribution is concerned because as we have said before, the vein, artery, lymph and bronchus all go together and are wrapped in one common fibrous sheath, so you must look for early changes along this bronchial tree.

It has been a much mooted question as to whether tuberculosis is primary in the lungs or in the lymph tissue in the mediastinum. Personally, I believe that it may be primary in either place but is most commonly primary in the lungs. Ghon has pointed out, it seems to me pretty conclusively, especially in children, that the primary lesion is first in the lungs and from there the infection is carried to the mediastinum. That the primary lesion may be completely healed and yet the mediastinal lesion be active and from it the lung becomes involved again by direct extension from the mediastinum seems quite reasonable as lymph tissue offers a richer medium for the growth of the tubercle bacillus than the lung tissue. Consequently, in this type of cases we are frequently able to make a fairly positive diagnosis of the condition because it is practically the only lesion with the exception of malignancy that would start in the mediastinum and involve the lung adjacent to it. Then too, in these cases we see definite involvement of the parabronchial glands. It has been shown that in tuberculosis there is always a greater deposit of calcium salts in the glands than with any other infection. This too applies particularly to children. In adults this does not hold good as there are many other causes that produce calcification.

There are certain factors, however, which help us in attempting to make an etiological diagnosis. In early cases we frequently see a slight clouding of the apex such as if the pleura had become a little thickened and the first rib on that side will be a little flattened out due to the contraction of the lung so that the apex on the affected side is smaller than on the other. Then too, we get small patches of apparent consolidation scattered through the lung substances. When these signs are present the condition is apt to be tuberculous in origin but not always as certain types of influenzal infection may give you the same picture.

Lord reports one case of influenzal infection which from a clinical standpoint was typical of tuberculosis. This case went on to cavity formation and it was only when an autopsy was obtained that the infection was determined to be one of influenza. Several cases have come under my own observation which have been diagnosed tuberculosis, not only from a clinical standpoint but also from the roentgenological examination. These cases have been watched and in two of them some three years later we were able to demonstrate that these cases were of influenzal origin.

From our studies we do not believe that tuberculosis in its early stages gives us a definite picture so that we can say absolutely that the tubercle bacillus is the etiological factor. We believe that many simple chronic infections can give us the same roentgenological picture. It is only when

tuberculous lesions have become sufficiently advanced that we begin to get a definite picture so that we can say absolutely that the condition is one of tuberculosis. We do not believe that we can differentiate between an active or an inactive lesion. It is true that the greater the amount of fibrous tissue present in a general sort of a way the more chronic the condition is, but it is impossible to determine roentgenologically when an inactive lesion becomes active. We feel that it is absolutely wrong to send a patient to a sanatorium or to out-line the treatment upon the roentgenological examination alone. In arriving at a diagnosis on pulmonary tuberculosis the roentgenological findings should be always taken in consideration with the clinical condition. It seems to us that the great aid that the roentgenogram gives us is that it shows very slight changes which cannot be obtained by the ordinary clinical methods and that the exact size of the lesion is shown. It does not, however, tell us the gravity of the lesion.

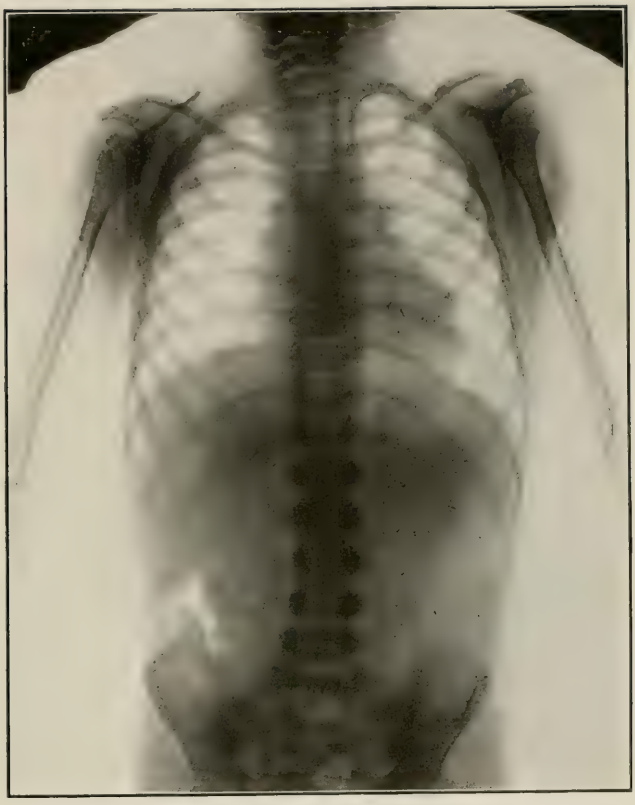
In conclusion let me make a hearty plea for cooperation between the clinician and the roentgenologist, as it is only by the bringing together of our laboratory methods with those of the clinical side that we obtain our best results.

DISCUSSION ON PAPERS BY DR. MINOR AND DR. BAETJER

Dr. Lawrason Brown, Saranac Lake: I regret to state that I can give you to-day only the impressions of my clinical experience. I have not been able to go over my cases and give you exact figures. The x-ray seems to me to occupy to-day more or less the same position that tuberculin did some years ago. Those who use it are in favor of it, and those who do not use it do not favor it nearly so much. We first began the use of it some fifteen years ago with an old static machine which was very unsatisfactory, and after taking some observations we gradually let it drop.

Then we had, on account of the alternating current that was in use in Saranac Lake, a Tesla coil. With the fluoroscope we were able to determine the movement of the diaphragm, but I found, as Dr. Minor has said he has done also, that we could get no better interpretation of the movement of the diaphragm by the fluoroscope than by careful percussion.

After this I had little experience with the x-ray, because we discontinued its use, until some eight or nine years ago when a case was referred to the sanatorium by one of the examining physicians in New York. The man had had a hemoptysis, and the examining physician could find no sign but he was sent away because the x-ray man who examined him, Dr. Cole, had decided that there was something in the third and fourth interspaces to the left of the sternum. Curiously enough, physical signs developed later just where the x-ray man said he had seen the lesion on a radiograph.



ROENTGENOGRAM NO. III.

Taken March 26, 1916, after 129 consecutive days of Tincture of Iodine ingestion.

I would like to say a word or two about the more recent apparatus. About four years ago we got a very fine apparatus and since then results have been more satisfactory, but before that time I had been somewhat skeptical about the use of the x-ray. I confess that I am now being rapidly won over to its use.

Now, a word about the different forms of examination, taking up first the fluoroscope, second, the radiograph, studying flat plates and stereoscopic plates. The fluoroscope is excellent for gross lesions. They tell you very frequently how much further the lesions extend than the physical signs indicate. They do not always correspond and further, I find, my fluoroscopic examinations do not always correspond with the radiographic plate. One point that Dr. Minor mentioned is that in some doubtful cases you can see the apices clear up on coughing. The fluoroscope is very valuable to check up our physical examination with. In speaking of the flat plates, I feel it is very difficult to interpret them.

Of course, as they have called to your attention to-day, Dr. Minor and Dr. Baetjer, the whole picture is nothing but a series of shadows. In the flat plate you have one superimposed upon another. It may very easily lead you astray. You must constantly bear that in mind. Shadows such as these may clear up when you use the stereoscopic plate. For gross lesions, however, the flat plate gives you ample evidence of tuberculosis; for very fine and early diagnosis, you will have to come to the use of the stereoscopic plate. In fact, to-day I might say I never feel like telling a patient that he has not got pulmonary tuberculosis until I have stereoscopic plates made, and have had an opportunity to examine them.

I believe with stereoscopic plates we can make a definite diagnosis long before you can with the use of the fluoroscope arrive at the same conclusion, and I believe you can make a positive diagnosis long before you can do so by physical signs in many cases who present definite symptoms of pulmonary tuberculosis.

I wanted to speak somewhat of the pathological anatomy. The most important thing here, however, is that some of the x-ray men make inferences without a great deal of proof. They have not connected any definite pathological changes with any definite changes in the x-ray pictures. I wanted to say something about the various stages of tuberculosis, the clinical classification, the incipient stage, how when you examine such patients with the x-ray you may pass them on to a more advanced stage; how in some moderately advanced stages you find cavities where the physical signs give no evidence of them.

Of course, when you get the physical signs of the cavity on examination it means that they must have some change in the pulmonary tissue around the cavity. I believe you can detect them with the x-ray long before you can by the ordinary methods of examination. In fact, I had three cases of cavity in one week in all of whom no physical signs whatsoever were present. We had proof that there were cavities by change of the fluid in the cavity. I agree with Dr. Baetjer that it is exceed-

ingly difficult to accept the bold statement by some radiographers regarding the presence of some cavities.

In conclusion, I was very skeptical at first about the value of these things, but I am becoming more convinced that when the proof of the interpretation of the x-ray shadows is finally brought out, we will recognize the great value of the x-ray. I am convinced that the fluoroscope must be used more frequently than the stereoscopic plates, on account of the expense. Bearing in mind the danger of inaccurate diagnosis from poor plates, by poor observers, I still believe that tuberculosis should not be excluded in any patient until a stereoscopic plate has been made, and we discover a total absence of gross lesions in the lung.

Dr. A. M. Forster, Colorado Springs: Some one has said that the x-ray discloses quantity and not quality, and it seems that this statement very well covers the attitude of the average clinician toward the use of the x-ray in the physical diagnosis of the chest. When Dr. Brown taught me physical diagnosis I remember he used to say that we could extend our physical findings about one-third, that we could only hear about two-thirds of the lesion and the rest we could take on faith, so I suppose that some of his enthusiasm for the x-ray to-day is due to the establishment of that fact. I think that the feeling of Dr. Webb and those of us associated with him is briefly, in regard to the x-ray, that in many cases it fails to give us as much evidence in early diagnosis as we can find by careful clinical examination, but that even in the apparently early cases we occasionally find signs with the x-ray either so situated or of such a nature as not to manifest themselves through the ordinary methods of examination.

I have a plate which I will pass about, in which the physical signs are very indefinite and yet where the evidence disclosed by the x-ray is unmistakable. We feel very strongly that leaving out of consideration the question of early diagnosis the x-ray is frequently invaluable in determining the extent of the lesion that we have to deal with, and oftentimes certain characteristics in regard to them that are not disclosed on physical examination.

The main point I wish to mention, however, is that I think there is a feeling on the part of a great many men who have striven earnestly to perfect themselves in physical diagnosis of the chest, and to impress upon the profession in general the importance of such examinations, that the movement which Dr. Minor spoke of, the enthusiastic attitude of the x-ray man as to the early diagnosis is dangerous. As in my experience is already the case, it leads the general practitioner to believe that x-ray evidence in early cases is absolutely dependable and final, and will go far toward delaying the results of the patient work of the last ten years, but certainly if the roentgenologists all take the attitude of the men who read the papers to-day, none of us can have very serious grounds for quarreling with them.

Dr. Frederick H. Heise, Saranac Lake: I agree with the previous speakers that the x-ray undoubtedly is of great advantage in the diagnosis and interpretation of the pathological conditions within the chest. I feel

it is of a great deal more value than the physical signs, alone, and any one, I think, who has done any amount of x-ray work and has correlated the evidence with the physical signs will agree with me in that respect.

In speaking of the relation of the fluoroscopic to the picture method, I think each has its own value. The fluoroscope does not always agree with the findings upon the plate, for the simple reason, I believe, that in taking a plate we use too great a penetration. If we gradually increase and decrease the penetration in our fluoroscopic work we will find a difference in the image on the screen, and as we reduce the penetration we find a greater variation between the plate method and the fluoroscopic method.

What is perhaps of more importance in Roentgen Ray diagnosis is the fact that we can determine, as Dr. Minor says, "the geographic aspect of tuberculosis," in other words, I would say, the pathological condition and extent of the tuberculosis within the chest.

We have come to believe that there are really two very distinct types of involvement within the chest, one of which I will call the peribronchial type, the other the parenchymatous type. And, although we have no pathological evidence as control or proof that what we interpret from the x-ray plate is really the pathology in the lung, nevertheless we have statistical evidence which gives us a reason for adhering to this classification.

If we take the lesions and classify them into incipient and moderately advanced, purely on physical signs, and then group the cases upon x-ray evidence only into the peribronchial and parenchymatous types, we find after careful comparison and analysis that there is a difference between incipient and moderately advanced cases in the parenchymatous and the peribronchial groups. This difference is readily seen when we compare the frequency of the occurrence of râles, tubercle bacilli in sputum, and such symptoms as may be taken as more or less positive evidence of the presence of pulmonary tuberculosis, such as: hemoptysis, pleurisy and fever.

We have found in an analysis of three hundred cases that of the peribronchial type only three per cent. had tubercle bacilli in their sputum at the time the plate was taken, whereas of the parenchymatous group forty-six per cent. had tubercle bacilli present at the time of the x-ray plate. Upon physical examination, râles were present in 33 per cent. of the peribronchial type, and in 75 per cent. of the parenchymatous type.

Comparing in like manner the previous occurrence of hemoptysis, we find the difference in percentages somewhat reduced, though at the same time they are comparatively far apart: peribronchial 27 per cent., parenchymatous 48 per cent. Pleurisy and fever in both groups had about the same percentage of occurrence.

With this evidence before us, gotten in an unbiased way, we feel we can say there are two distinct types, and if the x-ray will tell us nothing

more than that one patient belongs to one group or the other, it will have served its purpose well.

Furthermore, when we take the incipient case of the peribronchial group and compare it with the incipient case of the parenchymatous group, we find not only a much smaller percentage of positive sputum in the peribronchial group, but if we trace the cases over a course of years we find also that the percentage of relapses in group One (peribronchial) will approximate only one-half the relapses in group Two. And this ratio applies also to the moderately advanced cases.

For these reasons we do feel that there is something in the classification, although we do not have the positive proof that such groups exist.

Dr. Alfred Meyer, New York: In considering the relative value of physical diagnostic methods, and the Roentgen pictures, whether fluoroscopic or skiagraphic, I think it is only fair that the conclusions be reached by an expert physical diagnostician, and that the comparison should be made between such physician and an expert roentgenologist; I think it is extremely unfair to compare the results of a poor man on the one side and a good man on the other, and vice versa.

With reference to the early recognition of pulmonary tuberculosis, my own experience — I am not a roentgenologist, I am only a physician — my own experience has been that sometimes I have been able to go down with great delight to the roentgenologists and to say, "Well, I have beaten you by the older methods," and at other times I have gone to them and said, humbly, "Gentlemen, you have beaten me and I am glad to tell you."

With reference to the older diagnostic methods I want to say something that has usually escaped me when the question came up. I think that most of us will agree that that man is the best physical diagnostician, both from the ausculatory and percussion point of view, if he has had musical training and has kept it up. I have given advice to people who worked under me that in addition to their training in dispensary and elsewhere, if they want to improve their hearing, they ought to see a book that no doctor to whom I have ever spoken knows anything at all about. This book was written by Jadassohn, a professor of the Conservatory of Music in Leipzig. I got it from the Surgeon-General's library in Washington, in order to show to my colleagues in New York, to whom I have recommended it, and I want to recommend it to some of you. Some few may want to train yourselves in *absolute* and *relative pitch*, which I think to many men would be a distinct advantage in medical work, and they should get Jadassohn's book, buy it of Schirmer in New York, or try to get it from the Surgeon-General's library in Washington. All they need is to be able to read music notes, and to have a piano. If they spend a short time daily for a few weeks or more they will acquire absolute and relative pitch, the ability to get definite notes and whistle them, and hum them, and to recognize the pitch of a note

struck, and sometimes not to make more than a half or full note of mistake. Nobody seems to know anything at all about that.

Dr. H. K. Dunham, Cincinnati: This is one of the most gratifying things I have heard for a long time. I have not heard at any medical meeting so many nice things said about the x-ray, and diagnosis of pulmonary tuberculosis, in my whole life. In 1910 we brought out certain definite shadows based on clinical work alone. It was done at Hopkins. To-day that work is being checked up by pathological material alone. That is, you take the lungs from the chest, hang them up in front of the plate, just exactly as you would place the patient, x-ray them exactly in the same way, pick out the lesion you want to study, cut out that lesion and make serial sections of the part taken out.

That leads to just this one definite conclusion — there are many things that may make it wrong — and that is that there is a definite roentgenological picture of involvement of the lung by pulmonary tuberculosis. That lesion, as Dr. Minor has said, is a lesion of a triangular or fan shape, with the base of the triangle towards the pleura or the periphery of the lung, the apex of the triangle towards the hilus and it is usually seen upon the plate connected with the hilus by a heavy trunk. That is the picture of clinical peritoneal tuberculosis.

Now, what is the x-ray and why do we have that shadow? In the x-ray we have but one thing — we don't have a doctor, we don't have brains, we don't have any judgment at all, but we do have an instrument of precision for recording differences of density, and that triangle is there because of the tubercles being in the lungs, in a way that has not been previously described to us by the pathologists.

Those tubercles are the things causing the shadow, not one, not two, not a conglomerate of tubercles, but myriads of them branching along the bronchial tree, and those branches may be as on a tree, the far distant branches would only make a slight small shadow, but out to the pleura. The next one coming farther down would leave a larger cone or larger triangle until you involve the whole trunk or until you involve the whole lobe, because the whole lung is simply made up of a series of triangles. That is the definite x-ray picture of pulmonary peritoneal tuberculosis that is founded upon pathological facts and seen in our plates.

There is much to say. I want to thank all these men for the way they have gone at this from the beginning to the end. Every remark made has been valuable, and every man who has spoken has done wonderful work along that line. I approve of every word of it. I want to say this work is real. It has got to come, we can't always say this was incipient by the clinicians or the roentgenologists. In the very beginning of the work I stated, "Dunham, you have got to go to the dead room and there is no use talking about it. You have got to go to the dead room, and when you get there you have got to study those findings by serial sections."

I studied for four years, cutting lung after lung, by every other section, by gross section, by skipping four or five, and failed again and again, but

until Dr. Miller showed me that every single section had to be saved if you wanted to reconstruct that tree intelligently and see where those things were, and it was only when Dr. Miller showed us how that we were able to find that solution.

Dr. Minor: I have nothing more to say. I have stressed the points I wished. I believe that I made them as clear as I can. I think the fluoroscope is the instrument for the physicians; that the stereoscopic photograph is too elaborate for ordinary clinical use, and, therefore, we must fall back on the roentgenologist for stereoscopic work which in a certain number of cases is equally essential.

Dr. Baetjer: I think the discussion brought out what I attempted to show. We have heard both Dr. Brown and Dr. Heise about these cases where the x-ray gave us very definite signs, and immediately they brought in the question of the physical signs. That is the whole point I wanted to make, namely — that we are not right in making a diagnosis from the x-rays alone, but we have to take the physical signs with them.

Dr. Dunham, I think, brought that point out when he said he went to the autopsy room and studied tuberculosis there, and studied the incipient cases. We know incipient tuberculosis does not kill. Consequently, he got his material from a patient that died from something else, and probably tuberculosis had nothing to do with the death.

We have got to make a difference between roentgenological and clinical tuberculosis. The x-ray will show the size and location, but we do not know whether it is active or not, and the only reason, if there has been any reason for this paper, has been to show that we have to take everything together. We do not send a patient to the sanatorium if we hear a single râle. Therefore, we have no right to treat a patient along the lines of what we find from a roentgenological examination.

THE THERAPEUTIC VALUE OF THE U.S.P. TINCTURE OF IODINE IN THE TREATMENT OF TUBERCULOSIS AND OTHER INFECTIOUS DISEASES WHEN PROPERLY ADMINISTERED AND GIVEN IN PROGRESSIVELY INCREASING DOSES

By John Ritter, M.D.

Chicago

Iodine is described in the National Dispensatory as a gastro-intestinal irritant of intense severity, said to produce vomiting, diarrhea, and collapse, still death has rarely occurred. Has death directly attributable to the ingestion of Iodine ever occurred? It is further stated there that if death does not result from acute gastro-enteritis, secondary fatty degeneration of various organs may take place. That Iodine is given internally to a limited extent in the form of the tincture in 2 or 3 minim doses. Antidotes are also mentioned such as starch mixed with water, white of egg, milk, bicarbonate of soda, etc., and the stomach should be emptied by means of the stomach tube and lavage, or by means of emetics to get thoroughly rid of the poison and opium or morphine administered for the relief of pain.

In a recent State examination for licentiate in medicine appeared among others the following question: What is the Chemical Antidote for Iodine? And it may be assumed that the correct answer should be, moist starch. But why Iodine, why Starch? Is Iodine really such a toxic element that the physician must be impressed with this importance and be able, if suddenly called in a given case of Iodine ingestion, taken inadvertently or otherwise, to have the name of a proper antidote readily at his tongue's end? Is Iodine at all toxic? Tincture of Iodine U. S. P. contains 7 per cent. of pure Iodine, still the administration of 60 to 100 drops and more, three times a day can be maintained almost indefinitely and without any untoward result.

I am sure that many of us will recall the old stereotype prescription so much in vogue, among the elder practitioners, many years ago and which read somewhat like this: ℞ Iodine 4 grains, Iodide of Potassium 4 drachms, Syrup Sarsaparilla Compound 4 ounces. This formula was then much in use in all diseased conditions in which a distinct Iodine impression was desired and was given over very extended periods, almost indefinitely. A number of years ago Dr. A. B., then a very prominent physician in Chicago and who had a most lucrative practice, chiefly amongst a certain class of unfortunates, located temporarily at Hot Springs, Arkansas, and reporting to the medical profession, on his return,

for plates see facing pp. 150, 152 & 154

his observation on the use of Iodide of Potassium in chronic specific disorders given in connection with the warm baths, stated, that in a single day he had often administered 1000 grains, or more than 2 ounces. This was made possible, that, simultaneously with the administration of the salt, under the condition of the ingestion of large quantities of warm water and of frequent hot baths, the Iodide was rapidly and completely eliminated from the economy, so that tissue disturbance and cell irritation were impossible. In consulting the literature on this subject, we will find that, Iodine in the form of an alcoholic solution or tincture, as well as all the various salts of iodine, have repeatedly been administered in extremely large doses by many internists, chiefly by French enthusiasts, but this was generally only spasmodically and never found great favor.

Dr. L. Boudreau of Bordeaux, France, and who has given Iodine very systematically for more than 10 years in pulmonary and other forms of tuberculosis, pushing the remedy to its tolerance, in writing about the use of Iodine in the treatment of major infections recommends its systematic and intensive trial. He says:

"It is indicated wherever there is infection. Iodine is a natural component of the body, does not accumulate, is rapidly eliminated, is both microbicidal and antitoxic; a tonic to the human organism and vital functions; stimulates to the production of leucocytes, produces hyperleucytosis, and increased functioning of the glands especially the ductless. Indicated wherever fever develops, in all inflammatory condition, in septicemia, in typhoid and typhus, in puerperal fever, in meningitis, measles, scarlet fever, whooping cough, pneumonia, etc. The internal treatment with Iodine aids, not only in throwing off infection, reducing contagiousness, but wards off all complications." He recommends in the treatment of diseases peculiar to children, especially in acute infections, the rapidly increasing small dose method, day and night. In whooping cough in children at about the age of 7, 60 drops are given during the 24 hours and children at the age of 3 can take from 40 to 50 drops without apparent harm. In tuberculosis, the good effect of the administration of Iodine in the treatment is due to the increasing of the leucocytes, especially the mononuclears, and the augmentation of the phagocytic activity. He has usually administered it in the accustomed beverages of his clientel, supposedly in wine or beer. He has given the French Tincture of Iodine, which is a 12 per cent. solution of pure iodine in 90 per cent. alcohol, in large doses as high as 100 drops three times a day extending over long periods of time.

Having given Iodine in the form of the U. S. P. Tincture, and which, by the way, is only a 7 per cent. solution as compared with the French over a period of more than 2 years in progressively increasing dosage, I am now fully convinced of its decidedly beneficial, inhibitive and curative effect. Iodine may be administered with most favorable results, in all diseases due to the action of bacteria, even in small doses it possesses highly bactericidal properties. In cases of pus formation with a tendency

to absorption, for the removal of an inflammatory exudate, in acute and chronic pleurisy, tuberculous peritonitis, both ante and post operative, in pulmonary tuberculosis at any stage, in chronic fibroid phthisis, in glandular tuberculosis, in unresolved pneumonia as well as in the acute stage, in erysipelatous inflammation, in multiple abscesses, in osteomyelitis, etc.

A case history fully checked up by the periodic taking of roentgenograms during the course of the Iodine administration may illustrate this point. Master Phillip McD., age 4 years, on July 3, 1915, while at play accidentally swallowed an apricot stone which was lodged in the upper portion of the esophagus where it remained for more than a week. The lad began to fail, to lose flesh fast, not being able to take food. Seven days after, July 10, the boy was anesthetized and an attempt made to either withdraw the stone from above or push it down into the stomach and not succeeding, the surgeon made an incision over the left upper chest near the sternal end of the clavicle and by means of his index finger in the wound attempted to dislodge the obstruction. By these various maneuvers the stone was finally moved from its moorings and passed through the bowel the following day. Seven days after, July 17, a left sided pneumonia developed, pursuing a natural uneventful course when in the following week suddenly the opposite lung became involved causing the parents much concern. From this time on, that was in the latter part of July until the latter part of November, the child showed all the symptoms of a profound pulmonary right sided involvement. I first saw the child at this time and found it to be very pale, emaciated, with a high temperature and very rapid pulse, a continuous irritative and unproductive cough, in fact a very sick child and these conditions had now existed with more or less severity for nearly 4 months. Examination revealed a distinct bulging of the right lower chest accompanied by more or less moist râles on deep inspiration, increased bronchial breath sounds and distinct high pitched percussion note over the right upper. Fremitus could not be elicited as the child could not be induced to talk. Sputum secured for examination by forced cough showed the ordinary inflammatory exudate, some pneumococci, no T. B. bacilli. As a possible empyema was suspected, though doubtful, a roentgenogram was secured on Nov. 18, 1915, which as you will see from the picture (Roentgenogram No. 1) shows a distinct infiltration of the whole right lung with a comparatively clear left. The child, after the first examination was placed on Tincture of Iodine in 20 drop doses three times a day and a perceptible improvement in the boy's condition was soon noticeable and so on January 1st, 1916, a second roentgen picture was taken for comparison (Roentgenogram No. 2), this after an interval of 43 days (between the two). This second picture showed a decided clearing up of the shadow and the intensive Iodine treatment was continued until March 26th, when a third picture was taken (Roentgenogram No. 3) and this showed that the entire right lung was clear and again normal when all further medication was suspended. Repeated physical examinations during all this time revealed a gradual and steady improvement in the

lung condition. This child, four and one-half years of age, received during this period, that is from November 18, 1915, to March 26, 1916, more than 129 consecutive days, a teaspoonful of U. S. P. Tincture of Iodine daily.

It may be argued, that pneumonia is a self limited disease, that most cases will clear up without and in spite of treatment, nevertheless we all know and we all teach that a pneumonia which does not clear up in from 4 or at the longest in 6 weeks, is in all probability a tuberculous affair. If the pulmonary tissue, the alveoli, bronchioles and tubes for long periods of time, are constantly bathed in this inflammatory material, accompanied by high fever, rapid pulse and the production and absorption of toxic products it can not be long avoided, the bringing about of irreparable damage to the pulmonary parenchyma. If the giving of Tincture of Iodine in this intensive medication has not assisted in clearing up the lung conditions during the treatment of 129 days, what has done it?

When I first saw the child 124 days after the onset of the pneumonia, I beheld a very sick youngster and the very first thought that came to my mind after physical examination was that upon this boy's diseased and damaged pneumonic lung, a tuberculous process had been engrafted.

Now for some time I have administered the U. S. P. Tincture of Iodine in progressively increasing doses in the various conditions of tuberculosis that come to my attention. In a number of cases of pleurisy with effusion, when the effusion was small and no attempt was made at aspirating, the ingestion of Iodine has invariably been followed by amelioration of all symptoms of distress. In a case of tuberculous peritonitis the internal use of Iodine was continued for almost a year after the operation, the patient, a farmer's wife, gaining more than 30 pounds in weight. I have administered Tincture of Iodine in tuberculosis of the mediastinal glands, in bone and joint tuberculosis, in tuberculous sinuses, in pulmonary tuberculosis of any stage and am much impressed with its helpful, serviceable and yet harmless action when properly and intensively administered. Incidentally I may state that my attention was only recently called to a most interesting case reported in the literature. A physician attending a patient who was suffering from facial erysipelas prescribed Tincture of Ferric Chloride to be administered in 30 drop doses three or four times a day and calling on his client a few days later, was surprised to find him so much improved. The patient in the course of the conversation remarked that the medicine was all right but that he found it so strong, he could scarcely take it. The physician examined the vial and found that Tincture of Iodine had been dispensed in place of the Ferric Tincture; however, he was so much impressed with the rapid results that in the next case of erysipelas which came under his care he resorted to the Iodine medication at once and was again agreeably surprised by its prompt effect. I can attest to the value of Iodine in the treatment of this disorder having given it in three cases that came under my service recently with most gratifying results, but here again you may say that erysipelas is a self limited disease and while this must be admitted, yet the rapidity with which the inflammation sub-

sides, the rapid lowering of the temperature and pulse and the well being expressed by the patient, speak louder than mere words.

A safe method for the administration of Tincture of Iodine U.S.P.— The usual method here recommended for the administration of Tincture of Iodine, in either large or small, in progressively increasing dosage is by means of a simple, ordinary vehicle, namely mixed with good, wholesome, fresh cow's milk and as the human system is tolerant to excessively large doses, the ingestion may be continued by this method over long periods, almost indefinitely. Beginning with a single drop in half a glass of milk with the first meal, two drops at the second, three at the third and so on until a dosage of 20 or 30 drops has been reached, then this amount may be given three times a day and this maintained for some time. If it now be desired to increase this dose, then the gradually increasing drop method should be reassumed until 50, 60 or even 100 and more drops are given. When the highest single dose desirable has been reached this dose should then be given three times a day; should however an individual's idiosyncrasy show an iodine intolerance, then the dosage may be lessened or for a time entirely inhibited or suspended. Personally, I have never observed a single instance of intolerance, nor of iodism, nor any untoward effect, no systemic or organic disturbance, nor any so-called toxic or poisonous effect during the entire period of iodine ingestion. As not only in the treatment of tuberculosis but in all other disorders, no matter what remedy one may use, good judgment and individualization are necessary, so in the administration of iodine. The patient must be under constant observation and if at any time symptoms of intolerance should manifest themselves, then the remedy may be interdicted. As the dose is but gradually increased and if it may be desired to lessen the amount then the gradually decreasing drop method should be resorted to, lessening one drop with each meal; when the patient has shown marked improvement following the iodine intensive treatment, the dose may be decreased to one-half or less and maintained at that dosage.

Various Compounds, Salts and modifications of Iodine Suggested for Internal Medication.

Within a comparatively short period, the medical literature on the internal use of Iodine in the treatment of the various disorders due to the infectious diseases has been very materially enriched. In passing, it may also be stated that the advertising columns of many of the medical journals have not been spared.

Besides the use of Iodine in its pure and crystallized form in an alcoholic solution, attention has also been directed chiefly to a so-called modified Iodine said to possess active properties entirely different from the metalloid. We find some of these Iodine modifications mentioned as possessing most wonderful anti-bactericidal properties, for instance in the allotropic form, said to be far superior in this non-crystallizable form, or in its combinations with the various proteins, said to be entirely free from all toxic properties and free from all irritating qualities and far superior to the chemical salts, again, some are even said to be prepared by a most

peculiar process, this process so to bind the iodine as to make it entirely harmless for internal use, in short the ideal way for the administration of Iodine. The solution of Iodine in Tannic or Gallic Acid, Iodotannin, not a chemical compound, so much in use by many French internists should also be classed into this category. It should be remembered that in whatsoever form Iodine is used, in whatsoever way that it may be administered the end results will always be the same. No matter if Iodine is administered in its purity, or in the form of its salts, in the so-called modified or non-crystallizable, in its allotropic or in any other form, Iodine will be found in the blood plasma, in the kidneys and tissues, in identically the same combination irrespective of the form of ingestion and irrespective of the method of administration, hence the simpler method, that by mouth, the most natural way, is always efficacious and more so than by the methods of absorption through the vagina or rectum, by subcutaneous, intramuscular or intravenous injection besides most of the latter methods are cumbersome, some are more or less painful and offer no advantage over the simple method by giving Iodine in the form of the tincture by way of the mouth, mixed with cow's milk.

CONCLUSIONS AND SUMMARY

It must be admitted, notwithstanding from what has been said, that the ingestion of Iodine either in the free state, in its purity or in an alcoholic solution may have a most irritating effect upon the gastric mucosa, and this is due to the sudden coagulation of the albuminous secretions from the mucous layers of the stomach, producing localized, highly hyperæmic areas and the astringent and puckering effects which follow may cause serious disturbance. In giving the Iodine in a menstrum like sweet milk, one is quite sure to avoid all untoward symptoms and ill effects. Now the question arises,— may it not be possible that the so-called toxic effect of Iodine if it is at all toxic, is positively averted by giving it in a vehicle like milk which is its natural and physiological antidote or again may it not be that the non-toxic effect is due to the preparing, extemporaneously, of an albuminate of Iodine, a protein compound when it is administered in milk? And again Iodine being only soluble in an aqueous solution 1-7000, may it not be that the Iodine is precipitated in an impalpable powder and being suspended in milk makes it non-toxic? Be that as it may, it remains an established fact that the giving of Iodine in any reasonable dose either large or small will be tolerated by the most sensitive or delicate stomach capable of digesting milk and an Iodine impression may be brought about by this method in a simpler way and with quicker results than can be accomplished by any other, be it by either subcutaneous, intravenous or intra-muscular injections, or by local applications. By this method, the milk method, the administration of Iodine in the form of the tincture in from 60 to 100 drops three times a day may be maintained for months and months without the least fear of either a local or a systemic disturbance, hence, it may

be stated definitely and observations have warranted these contentions, that:

1. Iodine is both germicidal and antitoxic.
2. Iodine is non-toxic, non-irritant and non-caustic.
3. Iodine is rapidly eliminated and does not accumulate in the body.
4. Iodine does not coagulate albumen.
5. Iodine produces active phagocytosis.
6. Iodine is a recognized antiseptic possessing great powers for penetration.
7. Iodine so-called modified or in combination with various proteins possesses no advantage over the ordinary tincture, when given in milk.
8. Iodine organic preparations are all changed in the economy, the iodine being liberated from its molecule.
9. Iodine when given in milk has never produced iodism or gastric disturbances, both are negligible.
10. Iodine as an inhibitor or destroyer of bacillary growth, within the tissues and organs of the human body has no equal in medicine; hence, it is the most logical and appropriate remedy for the treatment of tuberculosis in all its various forms.

DISCUSSION ON PAPER BY DR. RITTER

Dr. Myer Solis-Cohen, Philadelphia: About two years ago, when I was making rounds at the Home for Consumptives at Chestnut Hill, Dr. Collins, the physician in charge, directed my attention to a woman who was suffering a great deal from vomiting, and I suggested to him that he use a measure that my father, Dr. J. Solis-Cohen, has often employed in vomiting, namely, one drop of tincture of iodine in half a glass of water every hour until the vomiting ceased. The treatment proved so beneficial that other patients who vomited were treated the same way. Dr. Collins noticed that in addition to the cessation of the vomiting the appetite increased and the patient seemed better. When the vomiting was over he stopped the iodine, and in every case the patients asked that it be continued because they seemed to feel better while taking it. Then Dr. Collins gave the iodine to more and more patients until finally he had a standing rule that every patient be given a drop of iodine in half a glass of water half an hour before meals. The dose was gradually increased to two or four drops. The drug seemed contraindicated in blood-spitters in whom it seemed sometimes to produce severe hemorrhages. It usually produced hemoptysis at the menstrual period in women who were subject to hemorrhage. As a rule tincture of iodine seemed to affect favorably appetite, digestion and weight. We have given it at Chestnut Hill to over four hundred patients.

Dr. Edward W. Collins, Philadelphia: Iodine in its different forms has long been a therapeutic agent of decided value in various forms of tubercu-

losis. The europhen, which is 28 per cent. iodine powder, has been used in oils and ointments for inunction. Potassium iodide, hydriodic acid, sodium iodide, calcium iodide all have their places in tuberculosis therapy, along with collodial iodine, which is now being exploited by so many of the proprietary houses. But rather a departure from these forms of iodine administration is the administration of the tincture given internally. It is not highly irritating, as popularly thought to be. If administered well diluted in water it acts as a gastric stimulant. I have found very few people whose stomachs would not retain the tincture of iodine administered in drop doses diluted in one-half glass of water. The tolerance can be raised to about from 6 to 10 drops in most cases before any signs of iodism appear, although I believe my best results have been obtained from the administration of from 2 to 4 drops in 4 ounces of water. It has the most remarkable effect on unretentive stomachs with loss of appetite. After a few doses the patient eats with an increased appetite and decided relish of the food, and later, as patients put it, cannot seem to get enough to eat. Occasionally, although very seldom, it has an irritating effect on the mucous membrane of the gastro-intestinal tract, producing a diarrhea. It is indicated in all cases excepting blood spitters and hemorrhage cases. I have seen a blood spitter on one drop of the tincture doing very well but when the dose was increased to 2 drops, the following day the patient had quite a severe hemorrhage. I have substantiated this fact by observing the same identical thing in three different cases. In women who spit blood the tincture produced hemoptysis during the menstrual period. This can be prevented by stopping the iodine a couple of days before the expected time of menstruation. The accompanying weight charts will show what a decided influence the administration of tincture of iodine had on the weight. A number of cases had received iodin for a period of time and were gaining weight; after the iodine was stopped these cases remained stationary in weight or lost, and when it was started again the loss was usually checked, and in most cases the patients started to gain weight once more. After stopping iodine the patients also said they experienced a loss of appetite and a distaste for food, and asked to be put on this treatment again as they felt much better in every way while taking the tincture. In my experience the tincture is indicated in all cases of tuberculosis excepting cases showing an idiosyncrasy to iodine blood spitters and far advanced cavity cases. It facilitates the forced feeding which is recognized as one of our best assets in the treatment of tuberculosis but which so many times destroys the functional activity of the stomach before we have obtained any decided results.

Dr. Ralph H. Hunt, East Orange, N. J.: The paper by Dr. Ritter has interested us very much. Our attention was first called to this method by a review which appeared in the September number 1914 of Progressive Medicine. The review was based upon an article by L. Boudreau appearing in *The Journal de med. de Bordeaux*, Jan. 14, 1914. The author employed a 10 per cent. solution of metallic iodine in 90 per cent. alcohol.

To one brought up on the accepted dosage of iodine internally, it

seemed revolutionary to read of giving a 10 per cent. solution of metallic iodine in 100 drop doses four times a day, and this without any toxic effects.

The theory on which it was used was that of a systemic sterilizer.

In the same journal articles of David Curle of Glasgow, and E. G. Reeve of London were also reviewed. The name of the reviewer, William Ewart, M.D., F.R.C.P., and the rather optimistic view tempted us to use the method.

Our method was to begin with four or five drops four times a day preferably in root beer. Often it was given in water, or milk. The root beer was always used as a vehicle in the larger doses.

We have never known a patient to refuse it. There have never been any symptoms of gastric irritation. We have never seen any symptoms of iodism. The largest doses we have used have been 30 drops four times a day.

It has seemed to us to have given more benefit in cases of pulmonary tuberculosis than any remedy we have used. There has been a singularly bracing and tonic effect, showing itself in an increased sense of well being, an increased appetite, and increase in weight. Among our cases which have done best in the last two years the majority have been under this intensive form of iodine treatment. Unfortunately all cases do not improve under its use. It suffices to say, however, that many cases have shown unusual improvement, and I wish to add this testimony to that of Dr. Ritter. It would seem wise that this method should be tried out on a larger scale that we may better judge its efficacy.

Dr. E. S. McSweeny, New York: After hearing Dr. Ritter's enthusiastic paper I hesitate to present the result of a small experiment which we carried on with the iodine treatment at Sea View Hospital in New York, but possibly it may be of value in saving some of the members a disappointment should they think of going through the procedure themselves, when they realize that perhaps the results which we have heard described are not always to be anticipated.

Van Lier published a paper in 1915 showing some very extraordinary and striking results in the healing of fistulæ in tuberculous cases as a result of iodine treatment. This supplemented work done and recorded in previous years. Doctor Wang, a resident physician with us, decided to treat several patients we had at the hospital by the method, and at the same time, as it involved very little extra labor to treat a group of pulmonary cases, both bedfast patients, far advanced with typical symptoms, and others with very definitely marked disease, but of ambulant type.

The treatment we used was the Hotz mixture of iodine, iodoform and glycerine. I have forgotten the exact proportions, but my recollection is, it is about a ten per cent. mixture. This is given in the gluteal muscles by hypodermic. In empyema sinuses, kidney sinuses and some gland cases without sinuses, the results were striking, all encouraging — and we felt that what had been published in regard to those was substantiated so

far as our small experience went, although none of them were brought to the point of cure.

In the pulmonary cases, on the other hand, absolutely nothing happened. The treatment was continued over some months. The patients received surprisingly large doses of this mixture, and were able to tolerate it without disturbance. Some became somewhat anemic, others showed some slight gastric upset easily controlled by varying the dose. You could go on increasing the dose apparently indefinitely. We stopped because no improvement was to be noted in the cases, and I can't state what the maximum dose we might have been able to give would have been, but so far as the pulmonary cases were concerned, our conclusion is that the effect was absolutely indifferent.

Dr. Alfred Meyer, New York: May I draw the attention of those present to an article published in Johns Hopkins' Bulletin some years ago on the ease with which large doses of urotropin could be administered to children when the secret of the method was understood, and that secret was that it should be given very largely diluted with water. At Johns Hopkins', preparatory to certain operations, they gave children somewhere between fifty and one hundred, and in some instances, one hundred and twenty grains a day, by giving a large goblet of water with each dose. So that, perhaps, is the secret of the administration of large doses of iodine, and so far as the demonstration of the value of iodine in tuberculosis is concerned, I cannot admit that the report of the case by Dr. Ritter and the demonstration of the skiagraph proves at all that he was treating a case of tuberculosis.

We cannot admit, as Dr. Ritter would suppose, that if a case of pneumonia is not resolved in four or six weeks that it is presumably tuberculosis. I think those of us who have seen a large number of cases of unresolved pneumonia cannot agree with him. I won't admit that it is so. Most of us will say that in many cases they can go longer and ultimately resolve without being on a tuberculous basis. Let me draw attention also to the possibility that the exposure of that particular case of pneumonia to the x-ray repeatedly, may have had something to do with the recovery of the child.

The treatment recommended by some of our German colleagues is to give them the x-ray treatment to hasten resolution, so that may be a possibility, irrespective of the fact that it took 129 days. In a good many cases in 129 days they resolve unaided.

Dr. Ritter: I have nothing more to add. I wish only briefly to call the attention of the members of this section to the fact that at the present time the medical literature is flooded with names of various iodine preparations, many proprietary, with supposedly wonderful curative effects in tuberculosis. I also wish to state that the administration of iodine in its simple form in the U. S. P. tincture is very much cheaper to the patient, is as distinct and definite in its effect as can be accomplished by any combination of iodine.

CHRONIC NON-TUBERCULOUS PULMONARY INFECTIONS

By Louis Hamman, M.D., and S. Wolman, M.D.

Baltimore

During the past eight years we have had under observation a group of patients who were nearly all diagnosed pulmonary tuberculosis at the first examination, but more prolonged observation has convinced us that the pulmonary infection is not due to the tubercle bacillus. We have selected twelve of the most characteristic of these cases as the basis of this brief report. The main interest in the condition is the importance and the difficulty of distinguishing it from chronic pulmonary tuberculosis. Although the infection does not depend upon a single specific organism, still, from a clinical standpoint these cases represent a distinct entity. Perhaps we can make the matter clearest by citing in brief outline the history of a few characteristic cases:

Case I.— Israel Engel. This patient, a Russian Jew, aged 25 years, a barber by occupation, came to the Phipps Dispensary of the Johns Hopkins Hospital on May 7, 1907, complaining of cough and shortness of breath. He had had a cough for two years previous to applying at the hospital, but dated his illness from two weeks before, when he was taken rather suddenly ill with fever, cough and hemoptysis. The day before admission he had spit up about an ounce of blood.

The examination showed a well nourished man of healthy appearance, with slight impairment of the percussion note and slight change in the breath sounds over both upper lobes, and more marked impairment and diminution of the intensity of the breath sounds, and numerous moist and sonorous râles over the left lower lobe. The 1 per cent. and the 5 per cent. conjunctival tuberculin tests were negative; the cutaneous test was definitely positive. Since this period, i. e., during the past eight years, the patient has been under observation almost constantly. He has cough and sputum practically always, although at times both disappear almost completely. The course of his illness has been characterized by marked exacerbations of the symptoms. As I have said, at times he is almost free from cough and expectoration. At other times he has attacks of fever, followed by a long period with marked cough and expectoration. During a number of these attacks he has had hemoptysis, on several occasions bringing up as much as half a pint of blood. Numerous sputum examinations have been negative for tubercle bacilli. The physical examination shows the same persisting lesion at the left lower lobe. On one occasion a streptothrix was cultivated from the sputum. X-ray

examination showed a diffuse fibrosis in both lungs which the roentgenologists interpreted as a tuberculous lesion.

The patient was examined last week after another attack of hemoptysis, and the physical examination showed the same lesion in the left lower lobe.

The patient spent three months at a sanatorium, with marked improvement of his general health, but without relief of his local symptoms, or change in the pulmonary signs. He was also treated with tuberculin over a long period of time, apparently with benefit to his general health, but again without relief of the cough and sputum, or change in the pulmonary signs.

Case II.— Mark Zeller, a ship-fitter, 21 years of age, came to the dispensary in August, 1908, complaining of cough and a heavy cold on the chest. He said that he had been perfectly well until the onset of grip about a week or two before coming to the hospital. He came to the hospital because the day before, after severe coughing, he brought up a little blood. He was a very robust, healthy young man, the physical examination showing, besides slight changes in percussion and in the character of the breath sounds over the upper lobes, definite impairment, diminution in intensity of the breath sounds, and numerous moist râles over the left lower lobe. The 1 per cent. and 5 per cent. conjunctival tests were negative, the cutaneous test was strongly positive.

After this visit the patient was followed until January, 1915, since which time we have had no word from him. He had cough and sputum almost constantly, and periods when these symptoms were greatly aggravated; he has had hemoptysis frequently, and on several occasions the hemoptysis has been large, according to his statements, a pint or more.

Physical examination has always shown the same left lower lobe lesion.

The patient was treated with Marmorek's serum, and spent six months at a tuberculosis sanatorium. Numerous sputum examinations have failed to show tubercle bacilli, but the influenza bacillus was grown from the sputum in pure culture. While the patient's general condition was markedly improved by his stay in the sanatorium, there was no change in his local symptoms or in the pulmonary physical signs. These were the same in January, 1915, as they had been when he first came to the hospital in August, 1908.

Case III.— Mollie Levin, a Jewish woman, 24 years of age, a tailor, came to the hospital in August, 1910, complaining of cough and pain in the chest. The history of the onset of the illness is rather indefinite, but apparently it began with an attack of grip that she had had shortly before.

The examination showed a well nourished woman of fairly healthy appearance, with slight changes over the upper lobes and a marked general bronchitis. Since this visit the patient has been under observation constantly. She was in one of the city hospitals for a month, and spent nine months at a tuberculosis sanatorium. During these six years she has had cough and abundant sputum constantly, but varying greatly in amount. She gained some weight while at the sanatorium, but otherwise her stay there had no influence upon the symptoms or upon the physical signs.

After the first examination, when the general bronchitis subsided, definite signs over the left lower lobe remained, namely, some impairment, diminution in the intensity of the breath sounds, and numerous moist râles. The localization has persisted throughout the past six years. The sputum has been repeatedly examined and tubercle bacilli have never been found. Sputum cultures have been made repeatedly, yielding usually a pneumococcus; but on one occasion a pure culture of influenza was obtained, and on two other occasions a pure culture of streptococcus mucosus.

Besides the cough and expectoration, fever has been a striking symptom. During the past five years she has had fever constantly, going in the afternoon to between 99 and 100, and often over 100. While at the sanatorium she spent nearly nine months in bed without the fever abating. In spite of the local symptoms and the fever, her general condition has remained exceptionally good. For a period of three years she has received autogenous vaccine treatment without any effect upon her local symptoms, nor upon the pulmonary lesion. She thinks, however, that her general health has been benefited by the treatment, although objectively there has been no striking results.

Case IV.— Jane Bennett — a white woman, 40 years of age, came to the hospital in October, 1908, complaining of having had cough and expectoration for a year and a half previous. She had had hemoptysis one year before coming to the hospital.

Examination showed the woman in fairly good general condition, with slight changes in percussion and numerous râles over both lower lobes, but particularly over the left. The patient was under observation continuously up to the time of her death in September, 1914. During this period of six years she had cough and expectoration constantly, with numerous small hemoptyses. She ran almost constantly a little fever. Tubercle bacilli were never found in the sputum on repeated examination. Sputum cultures showed a pure growth of pneumococcus. The 1 per cent. and the 5 per cent. conjunctival tests were negative. There was a slight cutaneous reaction to pure old tuberculin. In November, 1908, she showed a slight constitutional reaction to 10 mgms. of old tuberculin subcutaneously, and since during the reaction the râles became more abundant over the lower lobes, this was interpreted as a focal reaction.

In August, 1914, the patient was taken suddenly ill with a high fever and pain in the side. She was admitted to the hospital with signs of a right-sided pleurisy with effusion which, upon aspiration, proved to be purulent. The patient was extremely ill, and died within twenty-four hours after entering the hospital, on the third day of her acute illness. Autopsy showed encapsulated pneumococcus empyema on the right side. In both lower lobes the bronchi were dilated, filled with purulent material, and about these dilated bronchi were scattered areas of bronchopneumonia.

To draw a brief clinic picture from the twelve cases that we have selected for this discussion, I should say that the chief clinical features are as follows:

1. The onset may be gradual or abrupt. In four of the cases the symptoms came on definitely after some acute pulmonary infection which the patients describe as grip; in the other eight cases the symptoms developed insidiously, coming on like an ordinary cold without marked constitutional symptoms. In two of the cases there was an early, in one practically an initial hemoptysis. After the onset of the symptoms the most striking feature is the chronicity. The patients seldom get well; indeed, although we have followed several of them over a period of eight years, we have never observed any tendency towards improvement. The symptoms go on continuously, but in most the course is intermittent, and occasionally there may be periods when the symptoms almost completely disappear. The local symptoms are always marked. There is a great deal of cough and abundant sputum. The sputum is mucopurulent, and does not contain tubercle bacilli. There is a marked contrast between the severity of the local symptoms and physical signs and the absence of grave constitutional symptoms. The nutrition is very little, if at all, affected, in marked contrast to tuberculous infections. The mild fever often continues a period of years, and is unaffected by treatment. Usually the fever is higher during the exacerbations.

Most of the patients gradually develop dyspnœa, and attacks of pleurisy are common.

We have been struck by the frequent association of nose and throat infections, although when these infections are cleared up by appropriate treatment the pulmonary condition remains unaffected.

The lungs show signs of extensive infiltration with numerous moist râles, and occasionally the signs of localized consolidation. In association with these local signs there is often a generalized bronchitis, particularly during the period of exacerbation.

The most important features of the physical signs are:

1. That one of the lower lobes is almost constantly affected.
2. That the physical signs persist indefinitely, and
3. That they present marked variations in intensity.

As far as the pathology is concerned, drawing conclusions from the physical signs and from the one case that came to autopsy, the lesion consists of a localized bronchitis with infiltration of the bronchial wall, and foci of broncho-pneumonia about the smaller bronchi.

Etiologically the condition is not due to a single organism. The pneumococcus is found most commonly, but the influenza bacillus may occur in pure culture and still less frequently varying types of streptococci.

As far as treatment is concerned, we have found general hygienic dietetic treatment, vaccine treatment, tuberculin treatment and medicinal treatment to be absolutely unavailing. The general condition may be improved by these measures, but the local disease is unaffected. What improvement often seems to follow a given line of treatment we have subsequently been able to explain quite satisfactorily upon the tendency of the condition to remissions.

The chief interest of this group of cases is their resemblance to chronic pulmonary tuberculosis, and still their course is rather distinctive; and by careful observation they can be separated from tuberculous infections. The points of similarity with pulmonary tuberculosis are briefly these:

1. The disease is due to a chronic pulmonary infection, and most such chronic pulmonary infections are tuberculous.

2. The onset is usually insidious, and there is a long history of cough and sputum, pleural pain, hemoptysis, and fever.

3. The disease affects young adults, the age when tuberculosis is most common.

4. The presence of localized pulmonary infiltration, sometimes of consolidation, and not infrequently an associated pleural friction.

The following points mainly distinguish the condition from chronic pulmonary tuberculosis:

I. The absence of the usual constitutional symptoms of tuberculous infections. Although patients have fever, and unusually severe local symptoms, they are nearly always in good general condition, and although the disease lasts for years, nutrition seems to be unaffected.

II. The striking chronic course of the disease, with the persistence of symptoms and physical signs, varying spontaneously, and altogether uninfluenced by the usual methods of treatment to which tuberculous lesions respond.

III. The localization of the lesion. In our experience, this is always in one or both lower lobes, sometimes associated with a general bronchitis. It is unusual to have a tuberculous pulmonary lesion situated in the lower lobe alone, although occasionally such localization does occur.

IV. A marked variation in the physical signs. At times numerous râles are present; at other times the lesion is almost dry, and these variations in the physical signs do not always run parallel with variations in the symptoms.

V. The absence of progress in the lesion as regards either the extent or the intensity of the physical signs. In spite of the persistence of symptoms over such a long period of time, the localization of the lesion is constant.

VI. The absence of tubercle bacilli from the sputum.

As regards the position of this group of cases amongst other chronic pulmonary lesions, they must be distinguished sharply from the following conditions:

1st. Chronic bronchitis. The age incidence is important. In chronic bronchitis the signs are not localized. Hemoptysis does not occur.

2nd. Bronchiectasis. The patients do not give the characteristic history or the characteristic sputum of bronchiectasis. The sputum does not come up abundantly at one time; it is never foul smelling. There are no signs of cavity. There is no clubbing of the fingers. It is quite possible that some of these cases may develop bronchiectasis, but so far, we have not observed this to occur.

3rd. Chronic pneumonias, such as those described by Riesman.

Undoubtedly some of those broncho-pneumonias that fail to clear will gradually come into the group that we are describing. However, the distinguishing feature of the cases described by Riesman is that they do ultimately clear up. In most of our cases there is no history to indicate that they began as a pneumonia. In the majority of them the disease came on insidiously.

We believe that this group of cases deserves consideration as a separate pulmonary disease, not a separate disease in the sense of being a specific infection, but on the basis of a distinctive clinical course. We have become accustomed to speak of these cases as chronic non-tuberculous pulmonary infections, describing in this way their characteristic feature, namely, chronic pulmonary infections, and emphasizing the importance of distinguishing them from tuberculous lesions by adding, non-tuberculous.

DISCUSSION ON PAPER BY DRS. HAMMAN AND WOLMAN

Dr. Alfred Meyer, New York: I have had the floor so often I ought to apologize. I think some of those cases that I could follow that Dr. Hamman reported seemed to be an ideal type for diagnosis with the complement fixation test, and I hope Baltimore, Philadelphia and Boston will take up this diagnostic test in bacteriologically negative cases with some of the antigen that Dr. Miller has worked out at Columbia.

With reference to therapy, some of the cases reported seem to belong in the sphere of the surgeons. There have been reported quite a number of cases of resection of an entire lobe of the lung that recovered, and Dr. Lilienthal of New York alone has reported either two or three such cases. Two I am sure were a complete recovery after a resection of one lobe, and we medical men don't think often enough of the surgical aspect of some of these cases, some of Dr. Hamman's cases.

Dr. W. J. Durel, New Orleans: I would like to ask if the tuberculin tests were used in these cases?

In New Orleans, we have transferred from the general medical service into the tuberculosis wards not less than 28 cases simulating advanced tuberculosis. Of the cases, five autopsies proved beyond a doubt that they were cases of "non-tuberculosis." A number of other cases who were discharged from these wards, and who afterwards were followed up, showed by their behavior that they were not cases of tuberculosis.

The point I am coming to is this: When we consider the fact that the doctor said in his paper—that the majority of the cases reported were inmates of tuberculosis sanatoria for a long time before the proper diagnosis was made — I feel that we cannot disregard the fact that something else than "time" must point out to us whether a case is tuberculous or not.

I certainly have studied the diagnostic clinical and physical findings in the cases in the Charity Hospital, and, had it not been for the evidence

of the "negative tuberculin tests," we certainly would not have had any specific reason for transferring these cases back into the general medical service.

Of course, where we had the evidence of autopsy, that was very good; but in the living case, the re-transferring into the general medical service has been at times very disagreeable, and has led to some criticism.

Dr. Hamman: Many of the patients that I have spoken of did show varying grades of tuberculin hypersensitiveness. Some had a positive subcutaneous test; some a positive cutaneous test, and I think one or two a positive conjunctival test. In one instance, that the fatal case, the patient gave a positive reaction to the subcutaneous test, and we thought at the time a positive focal reaction. However, this was a misinterpretation due to a variation in the number of râles which we found subsequently occurred not infrequently.

I have outlined the general clinical features by which these cases may be distinguished from tuberculous infections. It is often impossible to make this distinction at a single visit. Many of the cases can be recognized definitely only after prolonged observation. The most important point to arouse suspicion and stimulate further investigation is the location of the lesion in one or both of the lower lobes.

THE TEETH IN TUBERCULOSIS

By David R. Lyman, M.D.

Wallingford, Conn.

The object of this brief paper is to present in a concrete form to the medical and executive heads of our hospitals and sanatoria a subject which we have sadly neglected: the care of the teeth of our tuberculous patients, especially those in our public institutions. We all recognize the value of good teeth, and, when the subject is brought up, readily agree to the importance of their being kept in good condition; but that is about as far as most of us have gone. Few of the text books or popular works on tuberculosis even allude to the subject beyond advising a regular use of the tooth brush. Knopf, in 1899, in his book on Prophylaxis and Treatment of Pulmonary Tuberculosis, wrote "The good condition of the teeth is of course essential, and a well conducted sanatorium should not be without its dental chair, and should receive the regular visits of an experienced dentist." For the most part, however, we have contented ourselves with giving instructions as to the daily brushing of the teeth, usually taking no measures to insure these instructions being followed. Our attitude is but another example of locking the stable door after the horse has been stolen; for surely if it is at all important that the patients be instructed in the cleaning of their teeth, it is infinitely more important that we take some steps toward seeing that they retain enough of their natural equipment to be worth while cleaning.

For the past year we have, at Gaylord Farm, been paying attention to this work, and have recently equipped a dental room and adopted the routine of having all patients' teeth put in thorough repair immediately after admission. We are following the lead of a very few of the sanatoria that have carried out this routine for some time; and, now that we have at last begun the work and are daily being reminded of the need which has gone unnoticed for the past ten years, I wonder more and more at our blindness.

In our modern medical literature we are growing accustomed to seeing many ailments, especially of the neurologic type, traced to conditions in the mouth, particularly since the development of the x-ray made it possible to detect hidden abscesses at the roots of apparently good teeth. It has even occurred that a visit to a good dentist and an extraction of a tooth has saved the patient from a Gasserian ganglion operation with all the attendant suffering and risk. We have also to consider the question of absorption into the system from deep cavities filled with decaying food, and from inflamed and pus bathed gums surrounding old sharp and decaying stumps and fragments of teeth. That there may be such absorption is eas-

ily conceived. That there is such absorption I for one am convinced. It is seen in the occasional disappearance of asthmatic attacks following a thorough cleaning up of a bad mouth. Indeed in these cases the possibilities of relief by the dentist should no more be overlooked than should the possible value of the nose and throat specialist.

The possibilities of the influence of diseased teeth and gums on the course of an ordinary case of pulmonary tuberculosis, were brought forcibly home to me some time ago by two cases. One, a woman of twenty-two, came to the sanatorium with a moderate lesion above the third rib on the left side. She was somewhat below weight and complained of considerable indigestion chiefly evidenced by gas and hyperacidity, and which had been present for several years. She was running an irregular temperature to 100 and slightly over. After three months in the sanatorium she had gained in weight and was in her usual health. The indigestion persisted as did the slight irregular fever, and this in spite of the fact that she had been under absolute rest, and that her lungs, instead of showing any increase in signs, were apparently distinctly better. While talking with her one day I was struck with the fact that her teeth were in very poor condition. I examined them and sent her to the dentist. He promptly extracted all twenty-two of her remaining teeth and a false set was provided. Within ten days her temperature was steadily below 99 and has remained so ever since. The patient has lost the indigestion which had troubled her for years and has gained sixty-five pounds.

The other patient was a woman with rather extensive disease of the moderately advanced type. She was an infirmary case and running daily temperature; but there was enough tuberculosis present to readily account for this. She had a severe chronic indigestion and her teeth were the worst I think that I have ever seen. We persuaded her to have them drawn, hoping to do away with the indigestion. This did clear up rapidly, but not so rapidly as the temperature which most unexpectedly and promptly came down to normal and remained there.

These and other cases have convinced me that at least a fair number of our persistent, slight temperatures are due to the complications in the mouth and not to the tuberculosis in the lung.

In order to show just what the need for this work really is and how serious is our neglect, I have examined the teeth of one hundred and forty-two men in the State sanatoria of Connecticut. I may say that the Connecticut Tuberculosis Commission asked the last legislature for funds to equip a dentist's office in each of their sanatoria, and urged the vital importance of so doing. I hope the data given below will aid us in securing this important reform next year. The cases reported are all adult males and are all "shack" cases; the more favorable type which we hope to send back to work "in prime physical condition"!

Of the 142 cases 5 had no teeth at all; 5 had no work needed and had lost no teeth; 9 had no work; 9 had a few teeth missing. The remaining 123 cases gave the following record: teeth missing 781; cavities needing filling 408; extractions needed 512. This is an average of over six teeth

lost and over four extractions and three fillings needed for every case. There were also 31 well developed cases of Riggs' disease, and at least nine-tenths of the teeth were sadly in need of cleaning. If, in fact, the teeth had been first cleaned the number of cavities found would probably have been much larger. As it stands, however, the evidence is sufficiently damning to condemn any board or body responsible for the continuance of such neglect. The conditions I have reported are, I feel sure, the rule and not the exception in our public institutions.

For years we have told the patients and the public that the cure of tuberculosis is a question of nutrition in which rest, fresh air, and good food are the three essentials. Good food is of little use unless it be made available by thorough digestion. Is there anything quite so essential to this as good teeth, and is not this condition fully as important to us as that of any other portion of the alimentary tract? More than this is it not possible that, as in my two cases, we may find the mouth, and not the tubercle bacillus and its toxins, responsible in many instances for the digestive disorders and slight persistent temperatures we habitually ascribe to the latter?

DISCUSSION ON PAPER BY DR. LYMAN

Dr. William Charles White, Pittsburgh: I rise only to congratulate Dr. Lyman and to emphasize the thing which he has brought out. Five years ago, out of the Red Cross Seal money, we got the Committee to give us a dental dispensary which is in the dispensary building and handles all the work of both the dispensary and the hospital. In order to make it of as little cost as possible, arrangements were made with the dental department of the University of Pittsburgh to send two students twice or three times a week to the dispensary for work under an instructor, and in this way the thing has become so heavy that we have now added a dentist to the staff who will reside in the hospital and put in full time upon the teeth in the dispensary and in the house. I think it is an exceedingly important part of the hospital's work.

Dr. Karl Schäffle, Harrisburg: I would like to ask Dr. Lyman whether he has tried the routine administration of emetin or ipecac? Of course, emetin is tremendously expensive now, but ipecac is not so expensive. For the last eighteen months Dr. Samuel G. Dixon, the Commissioner of Health of Pennsylvania, has ordered his sanatorium directors to use two drops of the fluid extract of ipecac to an ounce of water routinely night and morning in all cases that show pus pockets or obviously bad conditions of the teeth and jaws. The results have been very satisfactory. In the first place, these patients have been taught to pay some attention to their teeth, routinely to cleanse them, for the first time in the lives of many of them. In the second place, many pus pockets have been cleaned up. Most important, the digestion which is always a serious problem, especially with the far advanced cases, has materially improved. This is particularly true of Hamburg, which, lying near the

center of population of the State has the greatest number of cases in the third stage.

Dr. S. A. Knopf, New York: I should like to ask Dr. Lyman what is this instruction he gives patients regarding the care of tooth brushes? I have my own ideas, but I would like to hear his first.

Dr. Lyman: First, in regard to the treatment of the teeth, I am not a dentist, and I have not done anything, that is, as to the use of emetin in the treatment of Riggs' disease, which we have in our State sanatoria, and I have been studying up conditions to try to prove to the "powers that be" that they ought to give us something to clean teeth with. I have had no personal experience whatever with the use of emetin in those cases. We have been sending to a dentist and not treating ourselves until within the past month, when we put in our own dental equipment. We supply our patients with a tooth brush and glass and they keep their tooth brushes in Seiler's solution.

Dr. Knopf: I understand saline solution is cheaper.

REST OF THE INDIVIDUAL LUNG BY POSTURE

By Gerald B. Webb, M.D., Alexius M. Forster, M.D., and F. M. Houck, M.D.

Colorado Springs, Colo.

Respiration in a normal individual takes place upwards of thirty thousand times in twenty-four hours.

When a tuberculous patient rests on one side at night the dependent lung is restrained in motion, but the upper lung opens and closes some twelve thousand times in ten hours of sleep.

We have noticed a marked tendency for the consumptive to lie on the side of the better lung at night, as the following figures testify. It therefore often happens that the very lung which needs the most rest is getting the most work.

28 patients had a greatly involved left lung with an almost normal right lung; of these

17 slept on the right side
0 slept on the left side
8 slept on either side
3 slept on the back.

30 patients had a greatly involved right lung with an almost normal left lung; of these

13 slept on the left side
7 slept on the right side
8 slept on either side
2 slept on the back.

24 patients had a slightly involved left lung and an almost or quite normal right lung; of these

11 slept on the right side
4 slept on the left side
6 slept on either side
3 slept on the back.

41 patients had a slightly involved right lung and an almost or quite normal left lung; of these

7 slept on the left side
10 slept on the right side
15 slept on either side
9 slept on the back.

33 patients had about the same amount of tuberculosis in each lung.

4 slept on the left side
16 slept on the right side
12 slept on either side
1 slept on the back.

It would seem that a majority of normal individuals sleep on their right sides, yet there are certain factors which may determine otherwise. A nasal obstruction, the turning the eyes away from the light and other factors may have an influence on the position taken during sleep.

It was pointed out by Walsh [1] that in pulmonary tuberculosis the disease would seem to begin in most patients at the right apex. Later possibly the left apex would show evidence of disease and the further spread of tubercles would be to the left base.

We have ourselves noted that we have had more patients needing pneumothorax with extensive left than with extensive right sided tuberculosis.

The life history of the tubercle bacillus demands access to and egress from the host. It would seem possibly rational to imagine that in the tubercle bacillus making the human race meet its needs, the disease would become more widespread in the more exercised lung. The fact that the majority of individuals are apt to sleep on their right sides and the fact that a majority of advanced tuberculous lesions are to be found in the left lungs, may not prove to be entirely coincidental.

The experiences noted from successful artificial pneumothorax convincingly show the great value of rest of the tuberculous lung.

Rubel [2] has shown in rabbits injected intravenously with bovine tubercle bacilli that in an immobilized lung the tuberculous process becomes a chronic type whereas in the freely moving lung the disease is of a rapidly progressive type.

It would seem rational therefore to advise patients to lie on the side of the more diseased lung at night and also to rest in this position as much as possible in the day time.

We have noted that in general those patients who have unconsciously done this would seem to present more quiescent lesions.

Some fifteen years ago one of us advised this position of sleep and rest to a patient with advanced right sided lesions who to-day is in excellent general health.

In many patients, on account of the cough produced by such posture, we have allowed rest for a short time on the sound side in order to procure drainage and then we have trained them very gradually to rest upon the side containing the actively diseased lung.

During the past year we have applied this principle to a large number of cases, and in addition have placed under the dependent side a small firm pillow to restrain the motion of this lung to a greater degree. Some patients so treated have been able to remain lying on the side of the diseased lung over twenty hours a day for months at a time with little discomfort.

The results have been encouraging and we feel we have observed in certain cases a cessation of fever, a diminution of expectoration, and lessened liability to relapses.

In the normal individual there is probably little if any hyperæmia of the dependent lung during sleep. In a tuberculous patient, however, a moderate degree of hyperæmia is undoubtedly produced by prolonged rest on the affected side.

We would seem to have confirmation of this probability in several patients who have found hemorrhages to occur over a period of years whenever they have slept on the side of their diseased lung.

It would seem wise in future to observe all patients with nocturnal or early morning hemorrhages from the viewpoint of the side they have rested on at night.

In certain patients with heart lesions the rarity of pulmonary tuberculosis has been thought to be due to a possible back pressure of the blood in the pulmonary circulation.

Fagge [3] found only four cases of pulmonary tuberculosis with mitral stenosis in thirty years' records of post mortems at Guy's Hospital.

In searching the literature in regard to the above mentioned simple procedure little can be found.

Mendelsohn [4] advocated patients with pulmonary tuberculosis lying on the side of the healthy lung so that the discharge assisted by gravity could more easily flow to the bronchus and so be thrown off.

Link [5] in 1902 suggested patients resting for a few hours during the day time on the side of the tuberculous lung but from his article it would seem did not himself thoroughly carry out the suggestion.

Link, however, calls attention to the possibility of hyperæmia and also of the added rest of the affected lung by adopting such a procedure. Link observed the diminished respiratory murmur of the dependent lung.

(1) Walsh. National Association for Study and Prevention of Tuberculosis Transactions Fifth Annual Meeting.
(2) Rubel. Beiträge zur klinik der Tuberkulose. 1911, xviii.
(3) Fagge. Fishbergs Tuberculosis.
(4) Mendelsohn. Ueb. therap. Beeinflussung der Expektor. durch Heilmittel der Hypurgie. Berl. Klinik. 1899.
(5) Link. Lagerung d. Kranken bei einseitiger Spitzentub. Ztschr. f. Tuberkulose. III. 480.

THE FOLLOWING REFERENCES MAY ALSO BE CONSULTED:

Rubel. Funktionelle Ruhe d. Lungen, etc. Ztschr. f Tuberkulose. X. 193. 319.
Gerhardt. Die Lage der Kranken als Heilmittel. Zeitschrift f. Krankenpflege 1898, p. 88.
Galliard. Les pleuresies providentielles. Semaine med., 1897, p. 214.
v. Leyden. Der Comfort der Kranken als Heilfaktor. Zeitschr. f. Krankenfl. V. XX. 1898.
Reusner. Die Expectoration bei allein erhaltener Zwerchfellathmung. St. Petersb. med. Wochenschr., 1898. No. 2.

Our thanks are due the Modern Woodmen of America Sanatorium for inspection of their records.

GASTRIC FUNCTION IN PULMONARY TUBERCULOSIS *

By Henry K. Mohler, M.D., and Elmer H. Funk, M.D.

Philadelphia

The importance of a study of the gastric function in pulmonary tuberculosis can scarcely be overestimated when we consider the great frequency with which symptoms of disordered function occur, and particularly when we recall the important part which the digestion plays in the successful treatment of these patients. The frequency of gastric symptoms has been variously stated by different writers, thus Hutchinson, among the older observers, emphasized the frequency of dyspepsia as an early symptom, stating that it occurred in 92 per cent. of his cases and in 55 per cent. was quite severe. More recent observers give lower percentages, thus Janowsky 35 per cent., Levison 74.6 per cent. and Landis 55.3 per cent. In our own experience we found among 1000 consecutive patients with pulmonary tuberculosis in various stages that symptoms referable to the stomach were complained of in 64.6 per cent.

While gastric disturbances are very common, the symptoms produced are not entirely due to changes in the stomach peculiar to tuberculosis, but, as Landis pointed out are such as might occur in any chronic wasting disease. It is also a mistake to designate these disorders as purely functional, since catarrhal inflammation is commonly associated. Organic lesions other than catarrhal inflammation, such as ulcer, cicatricial stenosis of pylorus, etc., are extremely rare. This is in striking contrast with the alimentary tract below the stomach in which ulceration, particularly, is extremely common.

It is not the purpose of this paper to present a discussion of the pathological changes in the stomach, nevertheless, a brief summary of these changes will aid in the interpretation of the symptoms and disordered functions. We know practically nothing of the pathological anatomy of the stomach in early tuberculosis. In advanced lesions, however, autopsy reveals frequently a chronic catarrhal gastritis with some degree of dilatation. W. S. Fenwick states that it is rare to do an autopsy on these cases without encountering some increase in the dimensions of the organ. Among 100 cases in which a special note was made of the position of the lower margin it was found below the umbilicus in 64. He believes that the degree of gastrectasis bears a direct relation to the extent and chronicity of the pulmonary lesion. In six out of seven cases of acute

* From the Department of Medicine of the Jefferson Medical College, Philadelphia, Pa. Read before the National Association for the Study and Prevention of Tuberculosis, Washington, D. C., May 12, 1916.

miliary infection no increase in the size of the stomach was observed. The histologic changes in the stomach are largely those of chronic catarrhal inflammation. The studies of Marfan, Schwable, Fenwick and others confirm this view. Actual tuberculous lesions of the stomach are extremely rare, ulceration, the most common, occurring but twice in 2000 autopsies at the Brompton Hospital (Fenwick) and not once in 85 autopsies among our patients.

We have endeavored in the present study to investigate primarily the gastric function in early and advanced cases of tuberculosis, and having obtained this information, to correlate disordered function with disease and symptoms.

The studies of Rehfuss, Hawk and Bergeim and their co-workers in the Jefferson Medical College and Hospital have demonstrated the fallacy of the old time method of estimating gastric function by a single analysis of a test meal withdrawn one hour after ingestion by the large stomach tube with an aspirating bulb. The impossibility of interpreting the findings by this method depends upon, first, the inadequacy of the tube, and second, the fallacy of single one hour examinations. Harmer and Dodd have shown by x-ray studies that the old stomach tube does not completely remove the gastric contents. It is objectionable to the patient, causes considerable gagging and swallowing of mucus and cannot be retained in the stomach with any degree of comfort for any length of time. The tube which overcomes these objections is a smaller one of a diameter of 4 mm. which at one end has a perforated metal tip sufficiently heavy to pass by gravity into the stomach and its lowest portion. After insertion the tube may be left in situ as long as necessary until the whole phase of the gastric digestion has been studied. By this means small quantities (8 to 10 cc.) of gastric contents can be withdrawn at 15 minute intervals after the ingestion of the test meal and examined. By this method, termed " fractional estimation," a " secretory curve " can be established of considerable value in determining the gastric functions.

Practically all the recorded studies of gastric function in pulmonary tuberculosis, notably those of Edinger, Brieger, Klemperer, Schetty, Hildebrandt, Einhorn and Immerman were made by the old method and are, therefore, in the light of new methods, open to grave criticism as to their accuracy and their interpretation.

Einhorn found in 15 cases that normal acidity existed in five, hyperacidity in five and diminished, or absent acidity, in five cases. Klemperer, Immerman and Schetty found in early cases that the secretion was normal, or somewhat increased. Brieger found in the early stages that the cases of normal and disturbed secretion were about evenly divided; in moderate cases normal in 33 per cent., reduced in 60 per cent. and absent in 6.6 per cent., and in advanced cases, normal in 16 per cent., reduced in 74.4 per cent. and absent in 9.6 per cent. Van Valzah and Nisbet found in 65 per cent. of 73 comparatively early cases that the secretion of HCl. was normal, or above at least part of the time. Croner studied 36 cases of early tuberculosis and found the total acidity varied

from 21 to 80, except in five cases which showed a complete failure; in most cases, however, it was normal. Hayem studied 80 cases; among the 32 incipient, 15 showed hyperacidity, 16 hypoacidity and 2 apepsia. Among 48 advanced cases 15 showed hyperacidity and 33 hypoacidity. Reed, in his book on Diseases of the Stomach and Intestines, states that "it is now known that a large proportion of the cases of early phthisis — a preponderance of them, according to some observers — has an excessive secretion of HCl."

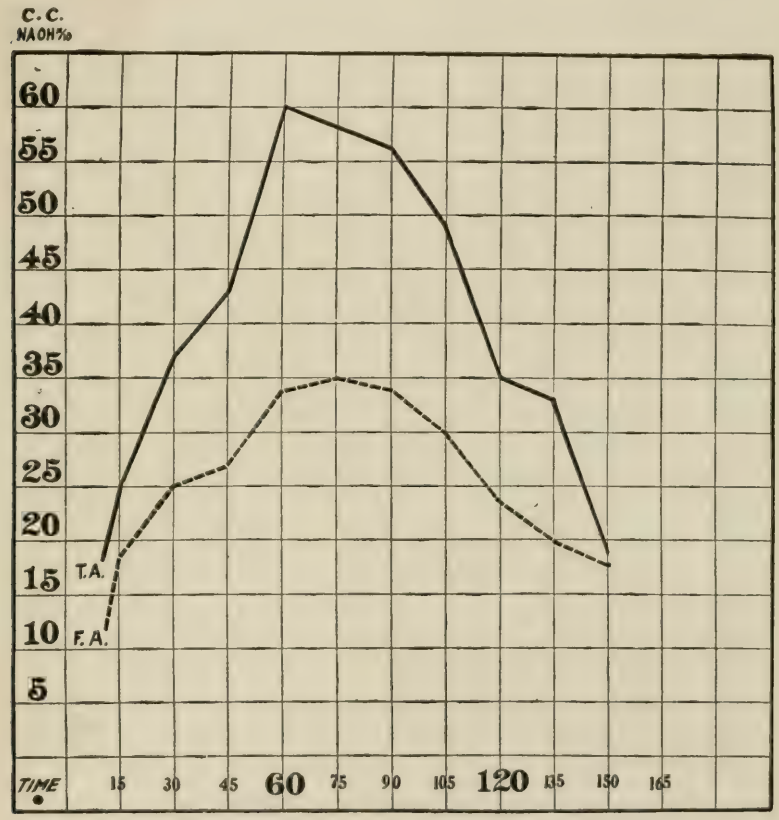


CHART I.—"Iso-secretory" type.

Klemperer found that free HCl. gradually disappeared as the pulmonary disease progressed, while Schetty could discover no marked alteration, and Immerman was able to find it even in advanced cases with fever. Hildebrandt believed that fever played an important rôle since he found HCl. absent in pyrexia and present in apyrexia.

The motor function of the stomach was studied by Immerman and Klemperer. The former found no changes, while the latter, using his oil method, found a marked enfeeblement. Einhorn found that the motor power of the stomach was not diminished to a very high degree, and

Brieger states that when the secretion of HCl. fails there is a diminution in motor power. King studied 26 cases and found in active incipient cases that the acidity and motility are increased; in inactive incipient cases no uniform disturbance other than that found in non-tuberculous individuals; in advanced cases, active and inactive, the tendency to a lowered acidity and motility. One of King's cases showed Achylia Gastrica.

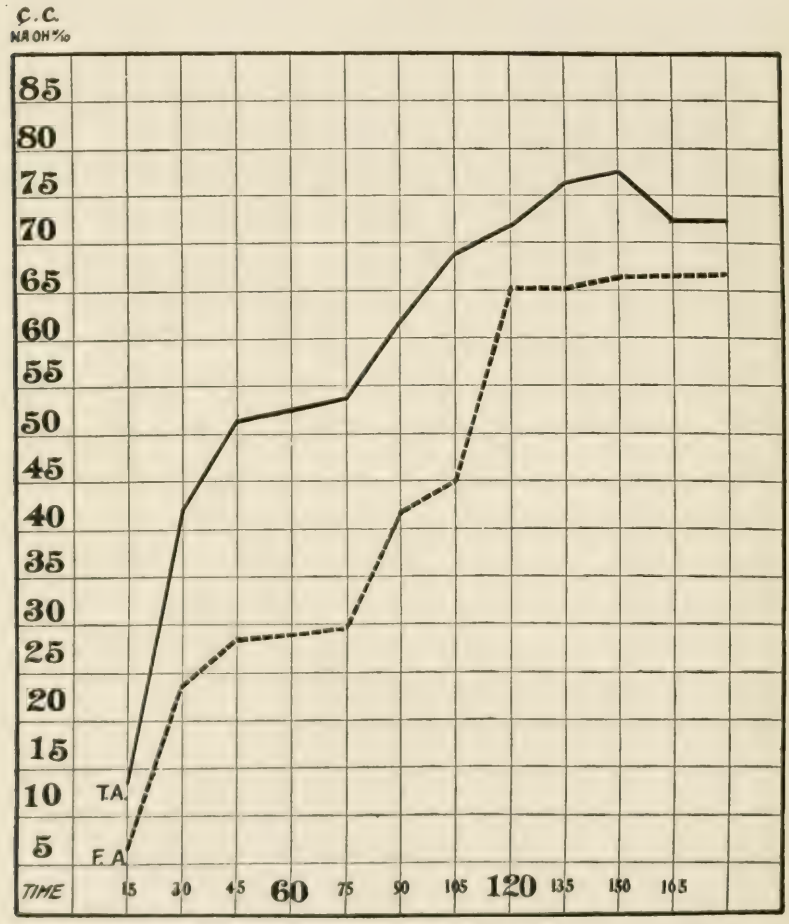


Chart. II.—Hypersecretory type with continued digestive secretion; no symptoms.

Munson in 1905 concluded a very excellent review of the literature and a personal study with the statement that the small amount of hyperacidity in his series, its occurrence in early as well as late cases, the marked tendency to hypoacidity and its frequent transformation into anachlorhydria and the undisturbed motor power made up the picture presented by his cases.

The lack of harmony must be perfectly evident and is due, perhaps,

to the inherent fallacies of the old method of study of the gastric functions which we discussed in early part of paper.

Rehfuss, Bergeim and Hawk found that in normal individuals no specific curve could be constructed that would include all cases free from gastro-intestinal symptoms. It was possible, however, to classify them according to one of the following three types:

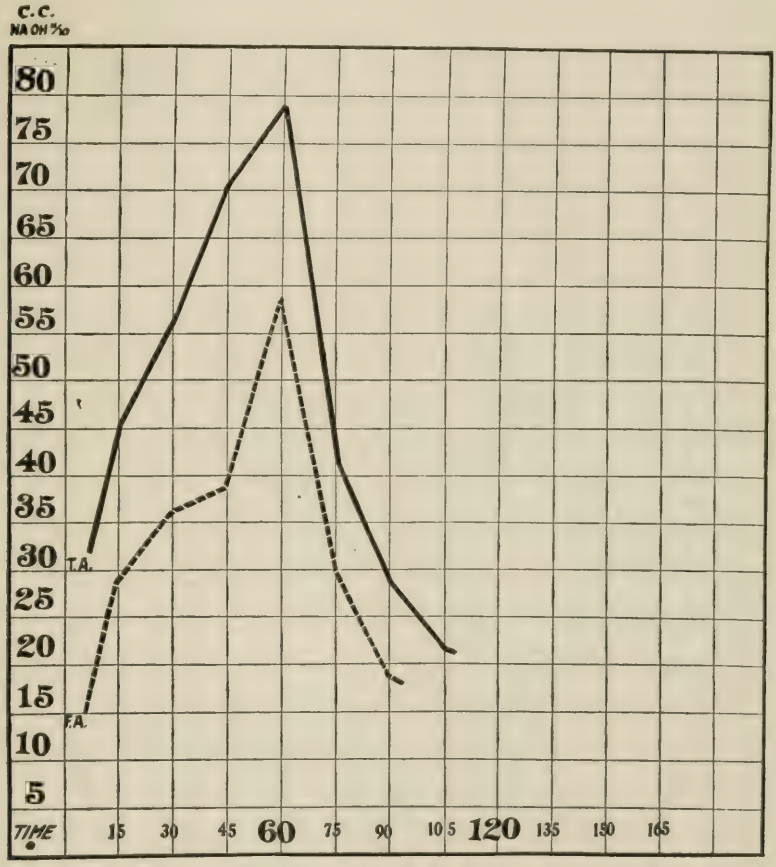


CHART III.—Hypermotility; absence of food rests after 1¼-hour period; no symptoms.

1. The "iso-secretory" type (Chart 1) shows a steady rise expressed in terms of cc. of tenth normal sodium hydroxide, maximum 60, usually sustained, from half an hour to one hour, and then a gradual decline with a total disappearance of the food residues in from two to two and one-half hours.

2. The "hypersecretory" type (Chart 2) shows a rapid response to stimuli, often a marked change in the acidity, rapid rise in the acidity high point from 70 to 100 or more, either abrupt or sustained and a slow

or no decline in the usual time. The test meal left the stomach in normal time, that is, from two to two and one-half hours, but even after the passage of all material there was encountered an outpouring of pure gastric juice for one-half hour, one hour, or even several hours. This finding was so common in symptomless cases that Rehfuss and his co-workers called it "continued" digestive secretion in contradistinction to hypersecretion which is a distinct clinical entity with symptoms.

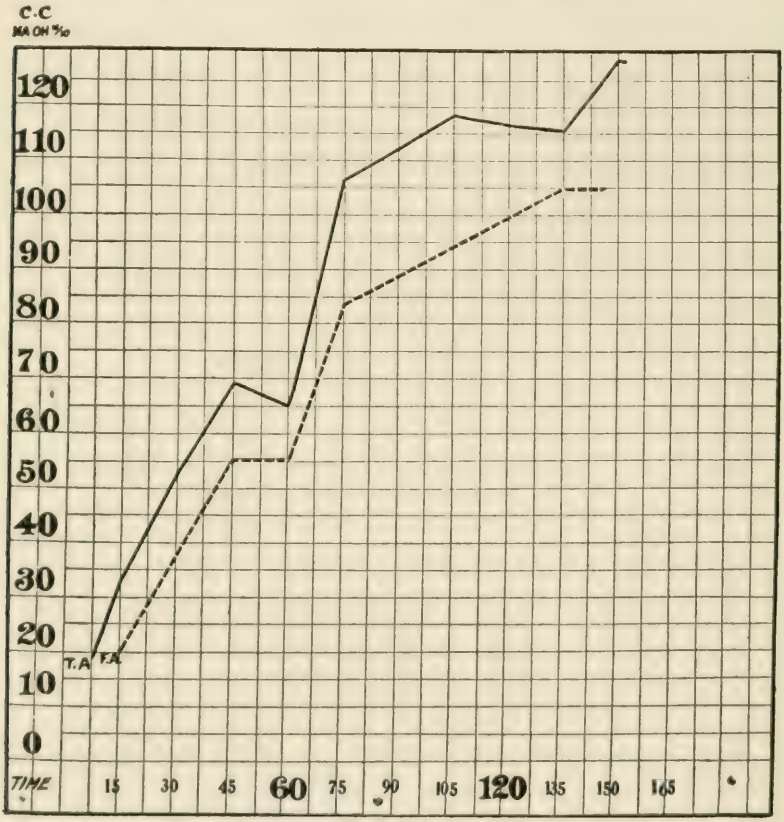


CHART IV.—Hyperacid type with continued digestive secretion; food rests at 2½-hour period-hypomotility; no symptoms.

3. The "hyposecretory" type (Chart 6) is similar to the first type, but there is usually a slower ascent, slower response to stimuli and a high point from 40 to 50. Rehfuss encountered this type least frequently in normal subjects.

The patients studied in our series comprise 22 early and 25 advanced cases of pulmonary tuberculosis.* The early cases were dispensary patients and the advanced cases were in the hospital wards.

* The technique employed is described in Hawk's 'Practical Phyciological Chemistry,' 5th Ed., 1916.

Early Cases.— Among the 22 early cases observed, 11 complained of symptoms referable to the gastro-intestinal tract. Of this number 3 suffered with symptoms prior to, and the remaining 8 subsequent to, the development of cough, fever, etc., symptoms common in early lesions.

The gastric symptoms complained of in order of frequency were belch-

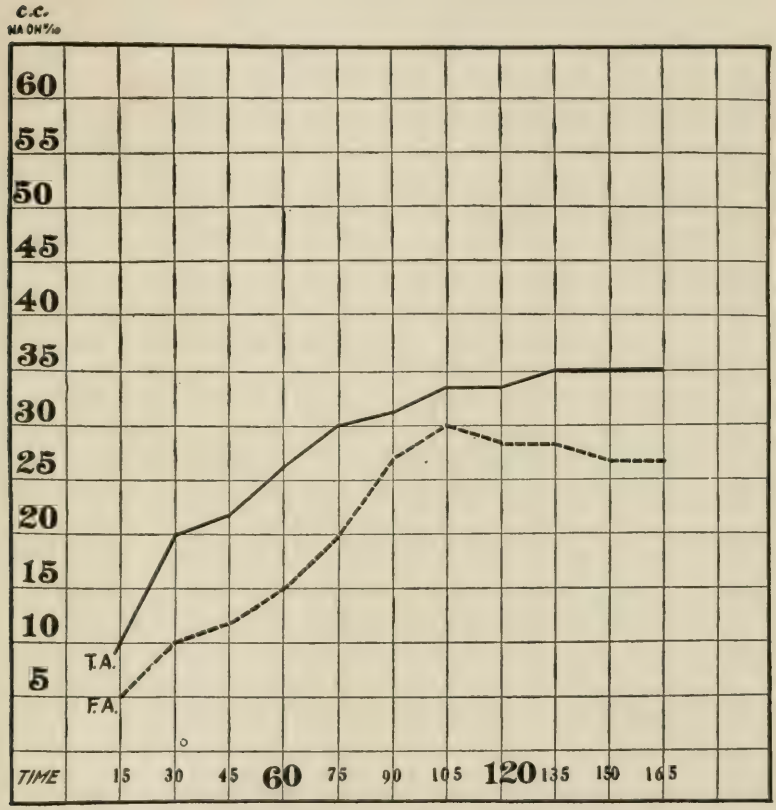


CHART V.—Typical curve showing delayed high point of acidity with continued secretion.

ing (which cannot be accounted for in every case by fermentation and was doubtless due to aerophagia), fulness and distress in the epigastrium, anorexia and vomiting.

The high point of the total acidity (expressed in terms of the number cc. of tenth normal sodium hydroxide required to neutralize 100 cc. of gastric juice) was noted in

6 cases at 1 hour
5 cases at 1¼ hours
4 cases at 1½ hours
3 cases at 2¼ hours
3 cases at 2½ hours
1 case at 2¾ hours

The high point of free acidity (expressed in terms of the number cc. of tenth normal sodium hydroxide required to neutralize 100 cc. of gastric juice) was noted in

1 case at ¾ hour
4 cases at 1 hour
5 cases at 1¼ hours
2 cases at 1½ hours
2 cases at 1¾ hours
4 cases at 2¼ hours
3 cases at 2½ hours
1 case at 2¾ hours

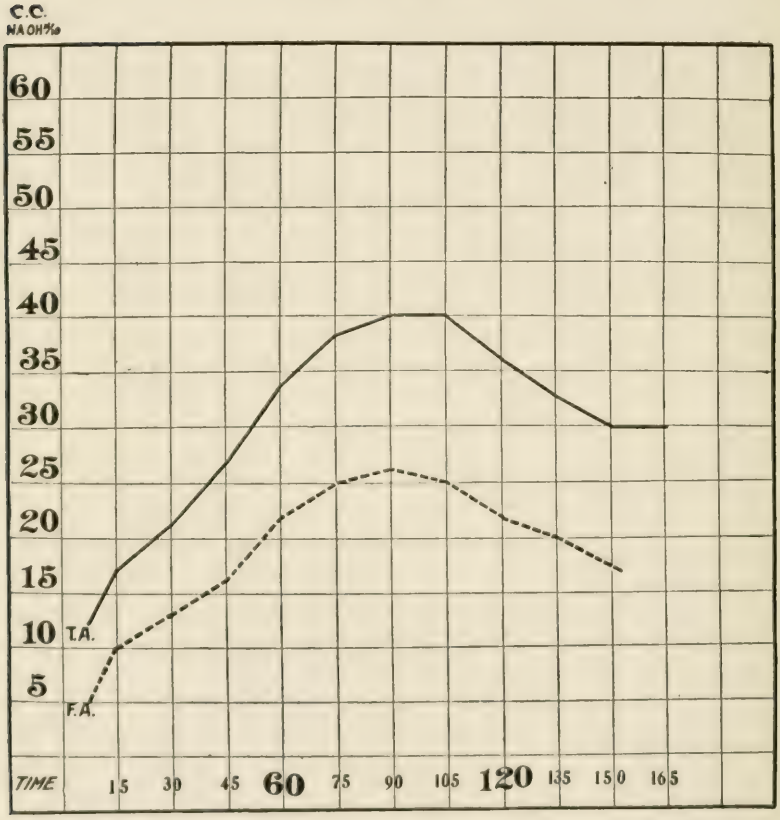


CHART VI.—Type of curve "hyposecretory" noted in 8 cases.

It will be noted in the series of 22 early cases studied the high point of total acidity occurred at or before the one and one quarter hour period in 11 instances. Of these 11 cases, 3 presented gastric symptoms and 8 no symptoms. One may assume that where the high point occurs at the 60 or 75 minute period, gastric symptoms are infrequent, provided the high point falls within the normal range of acidity. With regard to the 11 cases in which the high point of acidity occurred after the 75 minute period gastric symptoms were present in 7 instances and absent in 4, approximately a reversal of the former findings. The symptoms com-

plained of in these cases occurred in the period preceding the high point. The explanation is that the symptoms are doubtlessly due to delay and deficiency in gastric function.

Nine of the 22 cases showed curves which revealed that after the Ewald test meal had left the stomach the secretion of gastric juice continued and the acidity remained high, as shown in Chart 2, conforming with the "hypersecretory" type with "continued" digestive secretion.

After the administration of the Ewald meal, food rests were obtain-

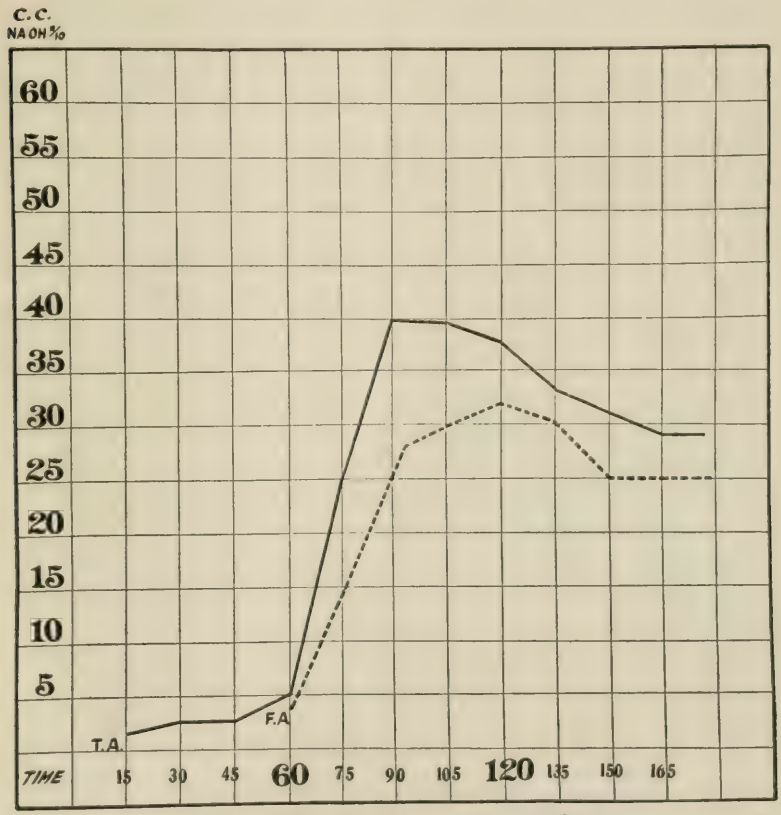


CHART VII.—Psychic achylia gastrica.

able at the end of two and one-half hours in five or 23 per cent. of the cases. We have been impressed by the lack of definite relation between gastric motility and gastric secretion. Case 19 (Chart 3) of our series of early cases presents a curve of acidity with hypermotility in which the Ewald meal left the stomach at the end of 75 minutes and the patient did not complain of symptoms referable to the gastro-intestinal tract. Abderhalden and Meyer have shown active pepsin in all parts of the small intestines. This observation, coupled with the action of trypsin in the intestines, may account for the lack of symptoms noted in this case.

On the other hand, in case 20 (Chart 4) which type of curve conforms to the "hypersecretory" with "continued" digestive secretion, the high point of total acidity reached 124 at the 150 minute period and presented no gastro-intestinal symptoms, while at the same time, considerable remains of the Ewald meal were recovered.

Our observations have shown us that in patients presenting one of

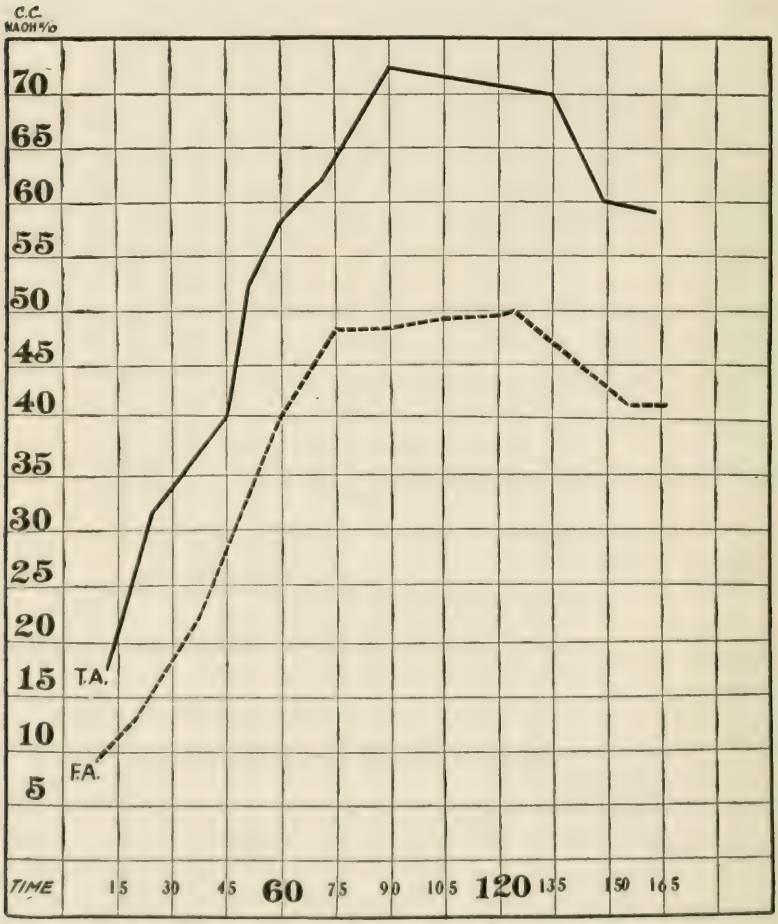


CHART VIII.—"Hypersecretory" type with symptoms of hyperacidity.

the normal types of secretory curves, it does not necessarily follow that they possess normal appetites, but it is true that it is rare to note the reverse, that is, a normal appetite in patients exhibiting distinct pathological secretory curves. That the psychic element plays an important rôle in the creation of appetites of patients is very evident. Seven cases showed an excessive amount of mucus in one or more specimens, or in the residuum. This condition occurred in patients complaining of gas-

tro-intestinal symptoms. Lactic acid was present during the first hour in 9 cases. Bile was noted in the morning residuum of six patients. Free and total acidity were present in greater or lesser amounts in all the morning residuums. The peptic activity in early cases was not studied. No case of true hyperacidity with symptoms was encountered in the study of this series of early cases.

Advanced Cases.— In a series of 25 advanced cases of pulmonary tuberculosis 24 patients complained of gastro-intestinal symptoms. The morning residuum revealed the presence of mucus, bacteria and leucocytes in excessive amounts in 20 of the cases. The tubercle bacillus was present in the residuum in 18 cases.

The time of the occurrence of the high point of total acidity in this series was noted as follows:

1 case at ¾ hour
7 cases at 1 hour
3 cases at 1¼ hours
3 cases at 1½ hours
6 cases at 1¾ hours
5 cases at 2 hours

The high point of free acidity was noted as follows:

1 case at ¾ hour
5 cases at 1 hour
4 cases at 1¼ hours
5 cases at 1½ hours
4 cases at 1¾ hours
6 cases at 2 hours

Fifteen of the advanced cases showed a slow ascent of curve with a late high point and continuation of the secretion, rather than a decline, thereby resulting in delayed gastric digestion, as illustrated in Chart 5.

After the administration of the Ewald meal food rests were obtainable at the end of two and one-half hours in 18, or 72 per cent. of the cases, suggesting the greater frequency of delayed motility in the advanced cases, as compared with early cases.

In 8 cases the curve conforms to the hypersecretory type, that is, a slow ascent to a high point which is sustained one-half to three quarters of an hour, and then a gradual decline, as represented in Chart 6. The high point for total acidity in this group of cases averaged 24, and for free acidity, 20, distinctly below the normal.

In one case we found a type of curve (Chart 7) representing psychic achylia in which the total acidity ranged from two at fifteen minutes to five at the end of one hour with a total absence of free acid and peptic activity. Following this period the total acidity and free acidity rapidly rose to 40 and 32 respectively. Gastro-intestinal symptoms were very prominent in this case during the first hour following the taking of food. This case represents a type which by the older methods of gastric analysis would have been interpreted a case of true achylia gastrica, rather than what we now know to be pseudo-achylia.

Only one case in this series of advanced cases, in fact only one in the

entire 47 cases of early and advanced, illustrates a type of "hypersecretory" curve with symptoms of hyperacidity, as shown in Chart 8.

In the study of the peptic activity in 8 cases of advanced pulmonary tuberculosis it was noted that when the total acidity was low and slow in ascent, the pepsin curve conformed to the acidity curve.

CONCLUSIONS

From a study of early and advanced cases under observation we conclude:

(1) That pulmonary tuberculosis causes a definite downward progression in the motility and secretory function of the stomach from the very beginning of the disease.

(2) That hyperacidity with symptoms occurring in early stages and described by previous writers as common, is quite rare. That even hyperacidity without symptoms is rare — the type which corresponds to the normal "hypersecretory curve" existing in 40-50 per cent. of normal individuals (Rehfuss) exists considerably less frequently in early tuberculous patients. This would indicate that even in early tuberculous patients changes in gastric functions are present.

(3) That the so-called "pretubercular dyspepsias" of previous writers are misnamed and that we believe they are in reality manifestations associated with definite tuberculous infection.

(4) That we do not believe, on the basis of our studies, that there is an "irritative stage" giving hyperacidity in early tuberculosis. Our studies suggest that the gastric disorder is the result of disease of the gastric mucosa.

(5) That there is a distinct tendency toward the formation of a definite clinical syndrome known as delayed digestion which becomes more and more associated with symptoms as the disease progresses.

(6) We believe with Einhorn that the swallowing of tuberculous sputum plays a highly important rôle in the continuation and aggravation of disordered function. No less important are the visceroptosis and gastrectasis.

(7) That the fractional estimation with the development of secretory curves is at present the most accurate method of studying the gastric function.

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THE RELATION OF TUBERCULOSIS OF THE BRONCHIAL GLANDS TO THE DIAGNOSIS OF TUBERCULOSIS OF THE LUNGS

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Tuberculosis of the bronchial glands may cause tuberculosis of the lungs in three ways: by representing the primary chancre of infection from whence supplies of tubercle bacilli may be transported to the lung at any time; by direct extensions of tuberculous processes from the glands surrounding the root of the lung: by pressure upon the trachea and bronchi which induces such secondary pathological changes in the lungs as to favor the development of tuberculous processes.

From this point of view, the diagnosis of tuberculosis of the lungs may begin with that of the bronchial glands and we should never say that there is no danger from tuberculosis until we have proven that there are no tuberculous processes in the bronchial glands. After we are confident that there are no physical signs in the lungs suggesting tuberculosis we must remember that it is equally important to determine whether there are any tuberculous processes in the bronchial glands or not and if there are, then the problem is how to estimate their effect upon the lungs when we have no physical signs to guide us.

There are two reasons for not finding tuberculosis of the lungs when it already exists: there are no physical signs or we find pathological conditions which are common to non-tuberculous diseases of the lungs and because these conditions are of such long duration we take it for granted that they cannot be tuberculous.

When the tuberculous processes extend from the hilum into the lung, it may not be possible to detect them by a physical examination and there is no analogy between the diagnosis of the apex or the pleura or other peripheral parts of the lungs and these creeping, thread-like peri-bronchial infiltrations which give no sign of their presence. It is possible to say with more or less accuracy that the upper part of the lung is involved to such or such an extent by depending upon physical signs but this is not true of the infiltrations extending from the hilum into the lung because the tissues are not impacted, there is not the infiltration en bloc, the physiological function of the larger bronchi is not altered, there is the same content of air, the intima is not roughened, the breath sounds are not changed and there is no dulness so that we have nothing to inform us of the first act of the tragedy being played in the lungs. A theoretical consideration of the pathology of these peri-bronchial extensions shows us when to expect their revelation by physical signs and when not. En-

larged tuberculous glands surrounding the root of the lung threaten its integrity in two ways: first by pressure upon and interference with the return circulation of blood and lymph from the lungs: second, by direct extensions by contiguity because these glands lie so close to the lung that as Osler has said it is sometimes very difficult to say where the lung tissues end and the glands begin. Kraemer [1] has compared the effects of the pressure exerted by these enlarged glands upon the return circulation from the lungs with those caused by enlarged cervical and inguinal glands and suggests that just as they cause edema and dilation of the veins of the face, neck, external genitalia and lower extremities, so the enlarged glands at the hilum cause stasis and edema of their drainage territories adjacent to them.

Remembering that the net work of vessels surrounding the alveoli would cover 150 square meters of surface if spread out on the floor,[2] and that all their immense content must be returned through the relatively narrow portals of the hilum, it is quite possible that a slight amount of pressure at the hilum might produce a disproportionate amount of obstruction which would congest the nearest areas of drainage which in the right lung would be the upper part of the lower lobe, the middle lobe and the lower part of the upper. This edematous condition might easily cause effusions into the interlobar fissures with subsequent plastic absorption and scar formations. Edematous infiltrations of the tissues surrounding the hilum would be more apt to cause dulness and altered breath sounds if there were not such an excess of large air passages over smaller that the air content was preserved over that lost. The exaggeration of the breath sounds into something like bronchophony may be caused by the pressure imparting a better carrying quality to the walls of the bronchi and this, with d'Espine's sign of increased transmission of the whispered voice are often the only and most reliable physical signs obtained from tuberculous processes in the bronchial glands. The pressure upon the bronchial circulation, the tendency to suffusion, to slowing of the currents, to subsidence of their contents and to a backward wash out of the bronchial glands, favor the gradual extension of tuberculous processes through the sheaths of the larger bronchi and on point by point to the smaller ones; leaving the regions surrounding the hilum and tracing these peribronchial infiltrations on their way through the lung, we find that there are no physical manifestations of their presence until they reach air passages which are not sufficiently rigid to resist their pressure; up to this point they have not affected the interior of the bronchi but have remained purely interstitial and inert; there is no attack and no defense; like foreign bodies they are fibrosed as fast as deposited and no harm is done because there is no toxemia, no absorption and no liberation of toxins. These fibrosed processes are more like lichens stretching along the limbs of trees than disease producers. Coming to the smaller and softer air passages with no cartilages to keep them open, they collapse, the air cannot enter as freely, the breath sounds are weakened and the lobules are not filled sufficiently to expand them promptly and vigor-

ously; insufficient breath sounds and insufficient expansion of the alveoli are the characteristic consequences of pressure upon the smaller air passages. There is no reason for altered breath sounds, for harsh or granular breathing or for any of the signs of disintegration; nor is there any dulness for the air content of the larger bronchi is preserved. It may even be that instead of dulness there is an increase of resonance suggesting emphysema. Even in the long, thin, flat chest with little or no motion in the intercostal spaces; even when the lung is so tied down that the chest rises and falls as a whole en cuirasse we may find to our surprise that not only is there no dulness but actual hyperresonance in some regions. Resonance characteristic of an excess of air, of emphysematous conditions. It is possible that the walls of the larger bronchi are rigid with their infiltrations and so do not expel their air as they should and that the retained air more than compensates for the loss in the terminal lobules. It is possible that we have a bronchitic emphysema which is comparable to the alveolar and produces the same lack of collapse and expansion with the same insufficient exchange of air and suppressed breath sounds. As one by one the terminal areas are choked off the leaves of the breathing spaces of the bronchial tree are obliterated, they collapse, form atelectatic areas, and the lung is tied down. Thus one lobule after another disappears until finally the branches chiefly remain and the breath cannot get much beyond the bronchi. This is fibroid phthisis par excellence without breaking down, without disintegration, without absorption of toxins. As the rigidity of the bronchial walls increases they cannot stretch and follow the expanding chest wall so that the thorax is drawn in eventually and there is dimpling over the hilum and in the second and third intercostal spaces near the sternum.

But all these evident manifestations come too late; what we need is detection as these infiltrations begin to creep from the hilum along the main bronchi through the paravertebral region on up to the apex, or through the sub-pleural spaces out to the axilla or downwards towards the base. When the lobules in the apex collapse we can discover it; when half an inch or more of normal lung substance in the cortex covers up the deeper extensions how can we detect them by physical signs? The pathology of these peribronchial extensions teaches us not to depend upon physical signs because we cannot obtain them; not to expect the signs of pneumonic infiltrations because the tissues are not infiltrated compactly; not to look for disintegration because there is no breaking down; not to rely upon harsh or granular breathing or râles of any kind but rather to seek for indications of gradual obliteration of the breathing spaces — which are the terminal lobules. Applying the ear directly to the skin we notice that as we feel the chest wall pulled out against it that we cannot hear the accustomed response of the entering air; instead of the rush of the air through the air passages and the prompt and uniform unfolding of the alveoli, we hear little or nothing; it is rather as if some stupor robbed us of our keenness of perception; as if our senses were dulled; as if a veil were drawn across between us and the lung; all is

dulled, blurred, obscured, suppressed, just as the nature of the pathological processes would lead us to expect.

The pressure from enlarged tuberculous glands surrounding the trachea and bronchi produce different effects upon the lungs than those caused by the glands at the hilum. When these glands enlarge and press upon the walls of the trachea and bronchi, circular constriction does not so much follow as a flattening or lateral thrusting in which narrows the lumen and causes tracheo-bronchial stenosis. In the beginning this stenosis does not obstruct the entrance of air because inspiration distends the air passages as the chest wall is pulled out and the stenosis is relieved; the entrance of air is also furthered by the weight of the atmosphere pressing down upon the column of air reaching from the upper air passages to the alveoli and forcing it down upon the retreating alveolar walls. As the chest wall falls back the lumen of the air passages is compressed, the stenosis returns, and now the column of air driven upwards by the collapse of the lung meets the stenosis and the weight of the atmosphere is against its escape. Delayed and difficult expiration results with retention of air distal to the stenosis; as the bronchial glands enlarge and the pressure increases the difficulty of getting rid of the accumulated air becomes greater until finally expiratory dyspnœa results; gradually the intra-bronchial and intra-alveolar pressure from the retained air increases and the essential features of asthma appear with more air entering the lung during inspiration than can be easily expelled by expiration and attacks of expiratory, asthmatic dyspnœa develop; with increasing accumulation of air and rise of intra-alveolar pressure, emphysema follows; if the backward thrust of the air against the stenosis is sufficiently great to force the wall of the bronchus out, there is bronchiectasis and expectoration of profuse, purulent sputum which as a rule does not contain tubercle bacilli; if the entering force of the column of air is not sufficient to distend the smaller air passages, they collapse and form areas of atelectasis; these atelectatic areas are especially apt to form in the lobules and to constitute the acinous-lobular type of infiltration. Irritation at the point of pressure and interference with the bronchial circulation causes hyperemia, inflammation of the mucosa, exudations and chronic bronchitis which may persist for years. The congestion of the vessels in the bronchial walls may cause rupture with hemoptysis and hemorrhages occurring at intervals and persisting for years. The irritation of the bronchi establishes a tendency to catching colds and repeated attacks of bronchitis. A cough may persist for years annoying and paroxysmal or so insignificant as to escape notice; dry and hard when due to pressure on the vagus, wet and easy when due to catarrhal conditions. As a consequence of tracheo-bronchial stenosis there are secondarily induced in the lungs diseased conditions similar to those of bilateral, chronic, diffuse bronchitis, asthma, emphysema, bronchiectasis and atelectasis, together with hemoptysis and hemorrhages. In these cases of tuberculosis of the lungs secondary to tuberculous processes in the bronchial glands, we cannot depend upon physical examina-

tions of the lungs for sufficiently reliable information to positively exclude the presence of danger. Before we can conscientiously give the verdict, no tuberculosis of the lungs because there are no physical signs, we may be forced to seek the aid of tuberculin and the Roentgen Ray.

The tuberculosis of bronchial glands is closely associated with the diagnosis of those cases of incipient tuberculosis which cannot be revealed by physical signs. The child has a cough or does not gain in weight or is not strong: The adult is not quite up to par; does not feel just right: has an innate conviction that something is wrong: cannot say just what it is but he is worried and anxious about himself: there is not enough vigor, or he does not sleep well or is very nervous. How many of these cases are dismissed with the comforting assurance that nothing is wrong? That the child is all right and the man tired or neurasthenic? Take a little vacation or go out in the country for a few days and you will be all right. There is absolutely nothing to worry about, there is nothing in the lungs.

In these cases with clinical suggestions of tuberculosis which cannot be confirmed by the physical findings in the lungs, before assuring the parent or patient that there can be no tuberculosis because nothing can be found in the lungs, should we not remember that it is very possible that we are dealing with tuberculosis of the bronchial glands which may some day cause tuberculosis of the lungs and that to effectually discover pulmonary tuberculosis in its very incipiency we may have to begin with that in the bronchial glands.

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PATHOLOGICAL SECTION

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COMPLEMENT FIXATION IN THE DIAGNOSIS OF TUBERCULOSIS *

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The presence of the tubercle bacillus in the discharges from tuberculous patients gives us little clue with regard to the activity or inactivity of the disease, and in the absence of such findings the diagnosis always is shrouded with an element of uncertainty. Clinical findings also fail to give us any direct information regarding activity or inactivity except in a crude way. Biological methods of diagnosis have thus far not fulfilled our highest expectations, but in complement fixation we still have a method which by gradual improvement may develop into diagnostic value equal to the Wassermann reaction in syphilis.

Widal & Lesourd [1] in 1901 were the first to demonstrate deviation of complement in tuberculosis, using homogeneous emulsions of tubercle bacilli of the Arloing-Courmont strain as antigen. Bordet & Gengou [2] demonstrated in 1903 tuberculosis antibody in the sera of tuberculous animals, and Wassermann & Brück [3] in 1906 observed antibody toward tuberculin in patients treated with tuberculin. Caulfield,[4] using bacillary emulsion as antigen obtained positive results in 33 per cent. of 104 cases of pulmonary tuberculosis of the Turban I type, 70 per cent. Turban II and 62 per cent. Turban III. Calmette & Massol,[5] using their special water and peptone soluble antigen obtained in 134 cases 92.5 per cent. fixation altogether. Fraser,[6] 1913, as a result of a study of a large variety of antigens concludes that one prepared from human living bacilli is most reliable, giving 96.6 per cent. negative results in normal individuals, but only 42.3 per cent. positive reactions in tuberculous individuals. She believes that diagnostically the complement fixation test with living bacilli is of more value from the standpoint of positive results than any other reaction discovered to date. Dudgeon, Meek & Weir [7] also tested a large number of antigens and concluded that products of the bacilli themselves were the most satisfactory. At a later period [8] they obtained by means of an alcoholic antigen prepared from tubercle bacilli out of a total of 234 cases, 209 (89.3 per cent.) positives, 194 of these on first examination, 11 (of the 15 negative) on second examination and 4 more on third examination. Besredka,[9] 1913, prepared an antigen by growing tubercle bacilli (of a questionable nature since they grow in 24-48 hours) on egg bouillon, heating and filtering. With this antigen Bronfenbren-

* From the Laboratories of the Municipal Tuberculosis Sanitarium of the City of Chicago.

ner[10] (1914) obtained a high percentage of positive results, 93.8 per cent. in active cases and 55.5 per cent. in convalescents, while suspected cases gave 75 per cent. and syphilitic sera 24 per cent. positive reactions. McIntosh, Fildes & Radcliffe[11] (1914) after an exhaustive study of a large variety of antigens also concluded that the living bacillary emulsion is best for complement fixation tests in tuberculosis. They obtained 76.7 per cent. positive results in 43 definite cases of phthisis, 80.7 per cent. in surgical tuberculosis, 37.5 per cent. in glandular, and 87 normal individuals only gave 3 positive reactions (2 of these were in lepers and one in a case of Addison's disease). They look upon a positive reaction as indicative of active tuberculosis. Craig[12] (1915) reports the results of examination of 166 cases of pulmonary tuberculosis, using as antigen an alcoholic extract of several strains of human tubercle bacilli which had been grown on a liquid medium of alkaline bouillon containing egg, with 96.2 per cent. positive results in active cases and 66.1 per cent. positive in inactive cases. One hundred and fifty cases of syphilis only gave 2 positive reactions, and on further examination these revealed lesions in the lungs. One hundred other diseases were examined and all gave negative results. These results are certainly wonderful, but it remains for future investigators to corroborate Craig's findings and prove this antigen to be specific.

As a result of an exhaustive study of the literature, a portion of which has been given above, it is to be noted that a great many of the investigators concede that a suspension of living tubercle bacilli is the antigen of greatest specific value and with the least number of objections. The objections raised to this antigen are the small limit between the antigenic and anticomplementary dose, the turbidity produced by the bacilli and the fairly high percentage of non-specific reactions. In the hope of overcoming these difficulties, and also imitating the liberation of antigenic materials as it occurs in the animal organism, it was decided to obtain an antigen from the tubercle bacillus by processes as nearly identical to those that occur in the body as possible. With this in mind, realizing that bacterial antigens are probably of protein character, and the highly favorable results obtained by means of autolysate antigens in the complement fixation test for gonorrhœa,[13] the following investigations were carried out.

After having determined that incubator temperature was more favorable for the liberation of the antigenic products from the tubercle bacillus, heavy suspensions of living tubercle bacilli of both the human and bovine types were made in sterile tubes and with sterile physiological salt solution. One set of these tubes was incubated aseptically, another set was incubated after the addition of toluene as an antiseptic, and a third set as control was heated for 30 minutes in a boiling water bath to kill the bacilli and then incubated. The toluene experiment was set up in order to determine whether we were dealing with a true autolysis or merely a simple dissolving out of endogenous nitrogenous materials from the bacilli. The criterion used for determining the disinte-

gration of the bacilli was the amount of non-coagulable nitrogen liberated by the Folin micro method. Reference to Chart I shows that there is a gradual liberation of non-coagulable nitrogenous substances from the tubercle bacillus at incubator temperature both in the aseptic and antiseptic experiments reaching its maximum at about the eighth to twelfth day, and this does not take place after the bacilli have been killed by heat.

In order to elaborate upon and check the findings above cited in another way, a series of 4 tubes were set up with equivalent amounts of tubercle bacilli suspended in salt solution in each. Instead of testing as above for the amount of non-coagulable nitrogen the autolysates were

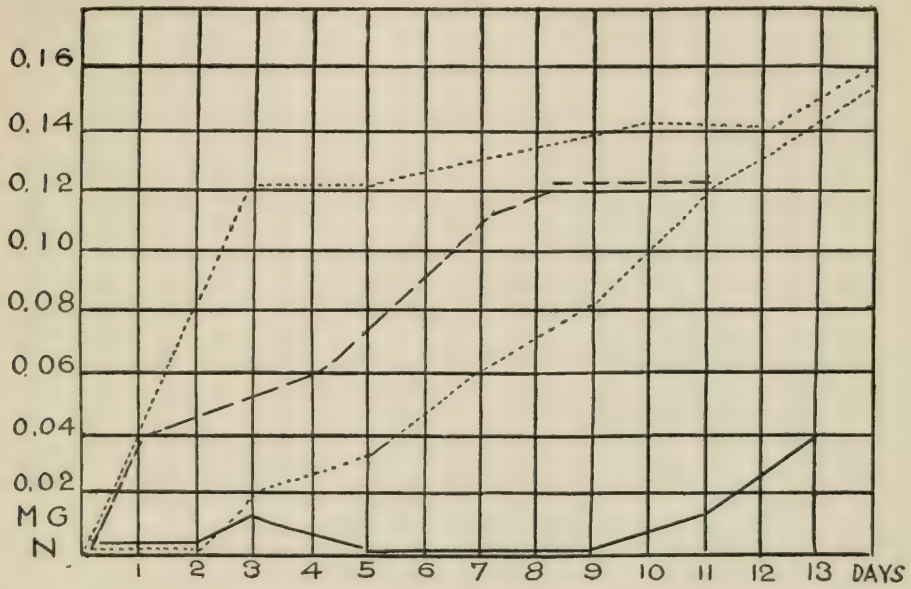


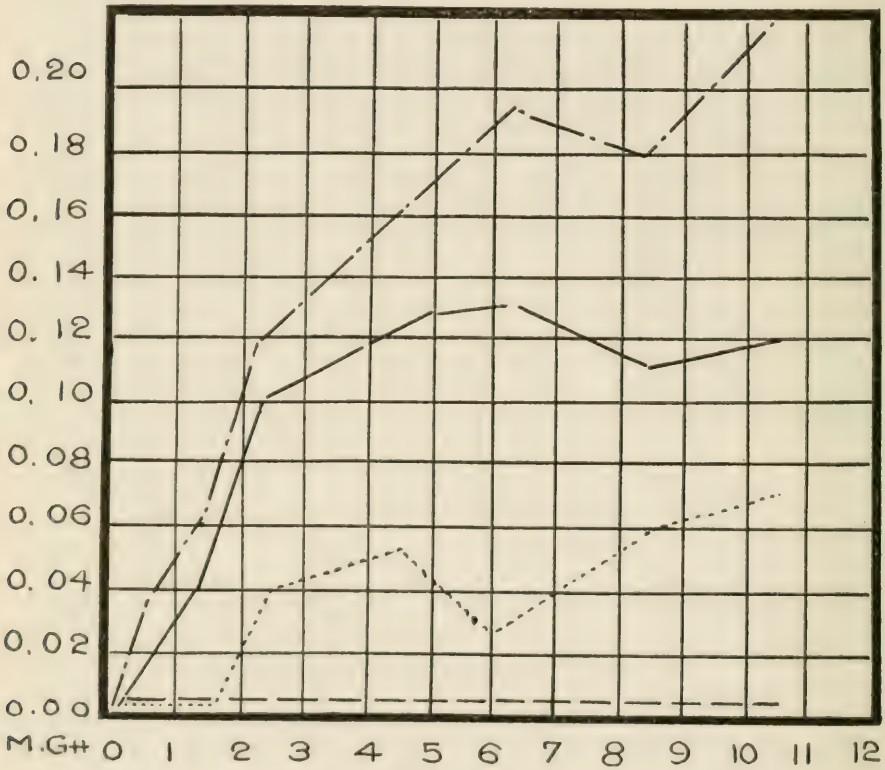
CHART I

Continuous line heated control at incubator temperature.
Dotted lines Aseptic Autolysis of two different cultures at incubator temp.
Dash line Antiseptic (Toluene) Autolysis, at incubator temp.

tested for the amount of alpha amino acid nitrogen by the recent colorimetric method of Harding & MacLean.[14] One of these tubes as control was heated and kept at incubator temperature, another was an aseptic autolysis at room temperature, a third was an aseptic autolysis in the incubator, and a fourth was an antiseptic (toluene) autolysis at incubator temperature. Reference to the findings plotted in Chart II reveal that there was no liberation of amino acid nitrogen in the control, there was a small amount liberated at room temperature, while the aseptic and antiseptic autolysate at incubator temperature both showed a definite and steady increase of amino acid nitrogen up to the tenth day.

The above experiments have been repeated using both human and

bovine tubercle bacilli of various strains, and the same was found to be true in every case. An attempt was made also to correlate the microscopical staining of tubercle bacilli autolyzed in salt solution with the chemical autolysis, but no changes of a characteristic nature were noted which would indicate an autolysis even after keeping for 50 days at incu-



AUTOLYSIS OF TUBERCLE BACILLI
AMINO ACID CURVES

CHART II

Dotted line is Aseptic Autolysis at room temperature.
Black dash line is heated control.
Continuous line is Aseptic Autolysis at incubator temp.
Dash and Dot line is Antiseptic (Toluene) Autolysis at incubator temp.
++ This is given in Milligrams of Amino Acids using Asparagin as the standard.

bator temperature as compared to controls heated and similarly kept or slides made at the beginning of the experiment. The ordinary carbol fuchsin method for staining was used for this purpose.

In order to note the relation between autolysis and the increase of antigenic strength in the autolysate, a series of suspensions of tubercle bacilli in sterile physiological salt solution were tested coincidentally at

definite intervals for non-coagulable nitrogen content, and titrated for antigenic strength. The latter was done by titrating varying amounts of the autolysate antigen against a four plus tuberculosis serum and noting the amount of complement fixation obtained. Although the nitrogen figures and the antigenic titer do not exactly increase parallel as noted in Chart III, there is a certain relation between them. An antigenic titer of O.1 cc. on the first day becomes, gradually and consistently, a titer of O.OOl cc. on the sixth day. Thus the autolysate from suspensions of living virulent tubercle bacilli becomes stronger in antigenic titer coincident with the occurrence of autolysis.

NITROGEN CURVE.		ANTIGEN CURVE.							
DAYS	MG. N. PER CC	0.2 CC	0.1 CC	0.5 CC	0.01 CC	0.005 CC	0.001 CC	0.0005 CC	0.0001 CC
0	0.0 0	+ + ++	+ + ++	+ + +	−	−	−	−	−
1	0.0 0	+ + ++	+ + ++	+ + +	±	−	−	−	−
2	0.0 1	+ + ++	+ + ++	+ + +	±	−	−	−	−
3	0.0 2	+ + ++	+ + ++	+ + +	+ + +	+ +	+	−	
4	0.0 3	+ + ++	+ + ++	+ + +	+ + +	+ + +	+	±	
6	0.0 5	+ + ++	+ + ++	+ + +	+ + +	+ + +	+ +	+ +	
8	0.0 6	+ + ++	+ + ++	+ + +	+ + +	+ + +	+ + +	+ +	
10	0.0 8	+ + ++	+ + ++	+ + +	+ + +	+ + +	+ + +	+	
13	0.1 5	+ + ++	+ + ++	+ + +	+ + +	+ + +	+ + +	+ +	

CHART III

CORRELATION OF AUTOLYSIS AND ANTIGEN FORMATION

Comparison of a bacillary emulsion and an autolysate antigen prepared from the same cultures in a large series of cases, over 600, revealed that the autolysate antigen possesses the following advantages: it possesses a much larger range between the antigenic and anticomplementary dose; it does not lose its titer when kept in the ice box (during a period of 7 months); it produces no interfering turbidity in the hemolytic system and it appears to be more specific.

For the sake of accurate comparison of the bacillary emulsion and autolysate (monovalent) antigens 361 accurately worked up cases are given in tabulated form (Chart IV). It is to be noted that the cases are divided according to the national Association classification and that the results are given as Neg. E.— negative results with bacillary emulsion; Neg. A.— negative autolysate; Positive E.— positive bacillary emulsion and Positive A — positive autolysate. Under sputum are given the findings for tubercle bacilli in the sputum while under V. P. are given the results of von Pirquet tests in the questionable and non-tuberculous cases. It is significant that all von Pirquet negatives in our series gave negative fixation tests. The complement fixation findings frequently appear in two figures on the chart. The upper figure followed by an "A" which designates an anticomplementary result, and the lower, or main, figure which gives all the remaining findings in such cases. All results are worked up on a basis of calling two or more plus as positive findings,

this criterion being used since it seems to give a more accurate view of the state of affairs and is the same as that used in making a positive Wassermann diagnosis. Briefly the findings may be summed up as follows: Only 1 non-tuberculous case out of 25 gave a positive reaction (96.0 per cent. negative) (the second positive having received a tuberculin injection a short time previous to making the test) by both tests; on questionable non-tuberculous cases 18 per cent. gave an autolysate test, while 45.5 per cent. gave an emulsion test; incipient inactive cases gave 14 per cent. positive reactions with the autolysate and 18 per cent. with the emulsion; incipient active cases gave the same with both — 23.3 per cent. reactions; moderately advanced inactive cases gave 7.15 per cent.

	PATIENTS EXAMINED	NO OF EXAMS.	NEG. E. RESULTS	NEG. A RESULTS	POSITIVE E RESULTS	POSITIVE A RESULTS	SPUTUM	V. B.
NON T.B.	25	26	1 A 23	24	2	2† 1 TUB Rx.	25-	1-11+
QUEST. NON T.B.	11	11	6	9	5	2	11-	3-6+
INCIP. INACT.	47	50	2 A 39	43	9	7	46-1+	
INCIP. ACT.	27	30	5 A 18	23	7	7	19-7+	
M.A. INACT.	12	14	10	13	4	1	6-6+	
M.A ACT.	47	55	8 A 24	37	23	18	12-34+	
F.A INACT.	5	5	4	4	1	1	3-2+	
F.A ACT.	187	216	28 A 112	1 A 155	76	60	15-172+	
TOTALS	361	407	280	309	127	98		

† One of these two received tuberculin treatment before drawing blood.

CHART IV

with the autolysate and 28.6 per cent. with the emulsion, while the active cases gave 37.7 per cent. with the autolysate and 41.8 per cent. with the emulsion; the far advanced inactive cases gave 20 per cent. reactions in both cases while the active cases gave 27.6 per cent. with the autolysate and 35 per cent. with the emulsion. A greater percentage of reactions is always obtained in the active cases, but the results seem to indicate, as pointed out by Fraser* that antibodies in free form capable of binding antigen (monovalent) are apparently not always present in the sera of tuberculous individuals, but they are more liable to be present in the active form of the disease. Now we may ask — has the complement

* Loc. cit.

fixation test for tuberculosis any practical value for diagnosis? Its value lies in the fact that when it is positive it practically, taken in conjunction with other findings, makes the diagnosis of tuberculosis definite. It is of value also from a differential diagnostic standpoint in pointing out tuberculosis when positive as against syphilis, abscess of the lung, empyema from other causes, carcinoma, bronchiectasis, etc.

Now that the complement fixation test for tuberculosis, using a monovalent autolysate antigen on single examination, has been found to be lacking in the point of percentage efficiency as a diagnostic test for tuberculosis, is it possible to further improve the test with a view to making it more efficient and correcting some of the possible deficiencies in the method as applied in the foregoing investigation? With this in mind the following points were taken up and the results may be briefly considered: first — is there a periodicity in the appearance and disappearance of tuberculosis amboceptor in the serum similar to the periodicity shown by the temperature curve? To determine this point bloods were drawn from patients every four hours covering a period of 24 hours. In the series were included sera from cases giving a four plus complement fixation both active and inactive, and cases giving negative reaction but showing either marked signs of activity or being totally inactive. Briefly it may be stated that the differences in the amount of fixation obtained during the various periods of the 24 hours were so slight that they could be of no practical significance in showing that it made any difference as to whether the blood was drawn morning, afternoon or evening. Repeats at weekly intervals have in a small number of cases thus far examined shown absolute agreement between the first and following examinations. Second — it has been suggested by a number of authors that possibly in the absence of an antibody test an antigen test might prove of value. Thus far a few hundred antigen tests have been made but the results obtained do not seem to warrant the labor incurred in carrying out the tests and, therefore, are of no practical value. Third — with a view to testing out the value of a polyvalent antigen two autolysate antigens have thus far been tested on several hundred cases and in brief it may be stated that the results obtained give promise of markedly increasing the efficiency of the complement fixation test for tuberculosis by using a polyvalent autolysate antigen.

In a general way, for example, as a result of 312 examinations made using a human and a bovine autolysate antigen on these sera there were obtained 60 positive results with the human autolysate antigen, the bovine being negative; 47 cases in which the bovine autolysate antigen gave a positive fixation test and the human was negative, and 72 cases in which both tests were positive, bringing the percentage total up to about 57 per cent. positive findings as compared to about 42 per cent. with the monovalent antigen. In a small series of tests in which the two monovalent antigens, human and bovine, were tested and the results compared with a mixed antigen, there was found to be no great difference in the

total findings. Out of 132 examinations made 70 of the sera were positive with either of the monovalent antigens and 74 with the mixed antigen. An advantage in favor of the mixed antigen.*

SUMMARY

1. Virulent cultures of tubercle bacilli free from all foreign substances suspended in sterile salt solution undergo autolysis at incubator temperature as indicated by the liberation of non-coagulable nitrogen and alpha amino acid nitrogen.

2. During this autolysis of virulent cultures of tubercle bacilli there is a coincident liberation of antigenic substances suitable for complement fixation for tuberculosis. The autolysate antigen possesses advantages over a suspension of living virulent tubercle bacilli as an antigen for the complement fixation test.

3. As a result of the examination of 361 patients, using both an emulsion and autolysate prepared from living virulent human tubercle bacilli as antigens (monovalent), 25 normals, 11 questionable non-tuberculous, and 325 definite tuberculous cases, it can be stated that:

(a) The complement fixation test for tuberculosis with a monovalent antigen is not an absolute test, being positive only in about 30 per cent. of all the clinically definite cases of tuberculosis both active and inactive. Active cases give a higher percentage positive results than inactive cases.

(b) The value of the complement fixation test for tuberculosis with a monovalent antigen lies in the fact that when the test is definitely positive, it practically, taken in conjunction with other findings makes the diagnosis of tuberculosis definite, as was previously noted by Fraser.

(c) It is of value also from a differential diagnostic standpoint when the diagnosis is obscure in indicating tuberculosis when positive as against syphilis, carcinoma, abscess of the lung, empyema from other causes than the tubercle bacillus, bronchiectasis, etc.

4. (a) No periodicity in the appearance and disappearance of tuberculosis amboceptor in the serum taken at intervals during 24 hours or weekly intervals was found.

(b) Tests for antigen in the serum proved of no practical value.

(c) Polyvalent autolysate antigen gives promise of higher percentage results than monovalent antigens, and thus may still increase the efficiency of the test to a higher percentage value.

5. The practical absence of the reaction with a monovalent antigen in non-tuberculous cases makes this test, when positive, of far greater value in the diagnosis of tuberculosis than any of the biological tests for tuberculosis thus far discovered. A positive test was never obtained in the absence of a von Pirquet test while a large percentage of von Pirquet's in normal individuals gave negative fixation tests.

* In conclusion I wish to express my appreciation to Mr. H. C. Sweaney and Dr. M. Marshak for their assistance in carrying out this work.

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A CLINICAL AND EXPERIMENTAL STUDY OF COMPLEMENT FIXATION IN TUBERCULOSIS

By S. A. Petroff

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In the past few years the Complement Fixation in tuberculosis has been taken up by a good many European and American investigators. Stimulated by the work published, we started this work in the Sanatorium Research Laboratory with the aim of confirming the work and also improving, if possible, the method of Complement Fixation. Our aim has been to modify the method so it might be more practical for general use, and also to devise, if possible, some antigen which would separate the active from the arrested tuberculous cases. When the difficulty that exists in determining whether or not a patient is arrested, to enable him to safely return to work, is realized, it can easily be understood that a test like Complement Fixation with a specific antigen, will be of great value in tuberculosis. How far we have succeeded in this problem, we can not at present state, but the low percentage of positive reactions in the clinically arrested cases, offers a fair hope of success. However, the conflicting opinions of clinicians as to different cases, make the laboratory findings uncertain. We hope to continue this work for some time to come, and only in the course of time, and by closely following the cases, can we hope to come to some definite conclusion.

Numerous investigators have studied this reaction. Most of them have used Koch's old tuberculin, and some form of bacillus emulsion. Positive results were not obtained in a sufficiently large proportion of cases to make the Complement Fixation of great diagnostic value. In 1914, Besredka devised a bouillon egg media for growing the tubercle bacillus. When the cultures were heated to 115 C. for one-half hour, and then filtered through a Berkefeld filter the filtrate, according to the author, proved to be very efficient both as a Tuberculin for therapeutic use, and also as an antigen for the Complement Fixation test. Inman, Bronfenbrenner and Stimson, working with this antigen, claimed very good results. Radcliffe, working with living tubercle bacilli emulsion, also obtained good results. About a month ago, Craig published his results on Complement Fixation. The antigen used by him was a slight modification of Besredka's.

After a very careful study of some twenty antigens, we came to the conclusion that Potato Filtrate from at least six different strains of T.B. was the most suitable antigen for this reaction. When we used the filtrate of only one strain, we obtained positive results in only about 35 per cent. of the cases. Later on, we devised an antigen of a lipoid nature. As we progressed with the work, there was a gap where we

failed to obtain positive results in ten per cent. or more of known positive cases. An antigen of protein nature was then devised which gave very interesting results.

There are many factors in this reaction, which may lead to faulty readings. If the serum is not well controlled it may lead to very conflicting results. The most important factor in this reaction, however, is the accurate titration of the hemolytic system. The complement must be titrated very accurately and a minimal double unit of complement must be used in the presence of an excess of the amboceptor. The amount of antigen must be at least one quarter of the anti-complementary dose; bacteriolytic incubation must be carried on in a water bath for one hour and a half at 38 C., and not in an ice box as some do. All these factors are of extreme importance for constantly reliable results.

In about one hundred cases, the sera were not inactivated. The active sera were diluted one to ten volumes with 0.85 per cent. sodium chlorid and two-tenths of this diluted serum were used in each test, the amount of anticomplementary sera used as control, was four-tenths, and that of the hemolytic control, one-tenth. When we used the active sera, the time for incubation of the (bacteriolytic) system was forty-five minutes. This very often gave us non-specific reactions. The rest of the cases were inactivated and the bacteriolytic period of incubation was increased to one and one-half hours.

I will describe briefly the technic carried out in our laboratory for the complement fixation test.

Our hemolytic system is anti-sheep, and is obtained as follows:

Rabbits are injected on the 1st day with 2 cc. of 50 per cent. red blood cells in 0.85 per cent. NaCl. On the third day, they are again injected with 3 cc., and on the fifth day, with 4 cc. On the seventh or eighth day, a small amount of blood is withdrawn from the ear vein, inactivated, and titrated. If we obtain a high titre we kill the rabbit, and the serum, after inactivation, is stored in small ampules. The method just described is very rapid, and gives a high titre. One of our rabbits gave a titre of 1 to 24,000.

Complement.— Fresh guinea pig complement was used in all our experiments. The guinea pig, after being anæsthetized, was bled from the heart, and the blood left to coagulate in the incubator at 38 C. for one hour. Then the clear serum was pipetted off and one part of the serum was diluted with nine parts of 0.85 per cent. sodium chloride.

If the volume of one unit of complement, after titration with two units of amboceptor and 0.5 cc. of 5 per cent. suspension of red cells, is not .1 cc., or at most .15 cc., so that when used in the test the volume of two units is .3 cc. or .2 cc., this complement is discarded. Very often we had to dilute our red blood cells so that .15 cc. of complement would give a complete hemolysis. For a while, we tried to make a pool of guinea pig sera, storing it in the ice chest after a sufficient amount of NaCl was added to make a 14 per cent. solution of NaCl. The result was not reliable, and we discarded this method.

Patient's Sera.— The blood was withdrawn from the median basilic vein, and left in the incubator for one hour; then the serum was pipetted off and centrifugalized. The clear serum was inactivated at 54 degrees C. for one-half hour.

Antigen No. 1 is polyvalent. It is made from six strains of human tubercle bacilli, isolated by the gentian violet method and grown separately on potato broth. After six weeks the broth is carefully filtered through several thicknesses of filter-paper. Care is taken not to contaminate the broth. No phenol or lysol were added as preservatives. With experience, one can almost always tell whether or not the antigen is of the proper strength. A good indication is its opalescence, and the change of color of the broth from dark brown to an almost golden yellow, during the growth of the T.B. bacilli. This antigen is then stored in the ice chest in small bottles of 25 cc. capacity.

I do not think that it is out of place to describe here the method of preparing the potato broth.

Potato Broth.— 500 grams of grated potatoes are infused in 1000 cc. of distilled water for twenty-four hours in the ice chest. At the end of that time, the infusion is filtered from the pulp through gauze, titrated, and the reaction adjusted to about one per cent. acid. The filtrate is then heated in the Autoclave at 15 pounds pressure for 15 minutes; then filtered through filter-paper. This clear brown fluid is again titrated, and the reaction adjusted to 0.5 per cent. acid. Glycerine is then added to make a 4 per cent. solution. 50 cc. of broth is put into 250 cc. flat bottles and sterilized for a half-hour each day for three successive days.

Antigen No. 2.— 0.25 grams of dry, pulverized tubercle bacilli are extracted with 50 cc. of 2 per cent. sodium hydroxide, the extraction being carried at 38 C. for five days. At the end of that time it is neutralized with normal hydrochloric acid. One part of this extraction is then diluted with three parts of 0.85 per cent. sodium chloride. .1 cc. of this dilution contains approximately .00125 grams of solid substance.

Antigen No. 3.— .25 milligrams of dried, ground tubercle bacilli are extracted in 100 cc. of methyl alcohol (Merk's Reagent) at 38 C. for five days, shaking the bottles two or three times every day. At the end of that time the clear extraction, after a prolonged centrifugalization is used for antigen. Dilute 1 cc. of this clear antigen with 15 cc. of 0.85 per cent. NaCl.

Sheep Red Cells.— The sheep's blood is withdrawn from the jugular vein and washed five times with 0.85 per cent. sodium chloride. One part of concentrated cells is diluted with 19 parts salt solution and .5 cc. of this dilution is used in each test.

Titration of Antigen.— For this purpose, a known positive and a known negative are necessary. The method is as follows:—

Antigen	.8	.6	.4	.3	.2	.15	.1	.05
P. S.	.1	.1	.1	.1	.1	.1	.1	.1
Compl.	.3	.3	.3	.3	.3	.3	.3	.3
NaCl.	.1	.3	.5	.6	.7	.75	.8	.85

After one and one-half hours incubation at 38 C. the hemolytic system is added:—

Sheep Cells:	.5	.5	.5	.5	.5	.5	.5	.5
Anti-sheep: Amb.	.2	.2	.2	.2	.2	.2	.2	.2

(Use same dilution for the known positive sera on front row. In the back row, the negative sera.)

It will invariably be found when we have the proper antigen that our positive sera, even with as small quantity of antigen as .05, will give us complete fixation, while, on the other hand, the negative sera, even when containing .8 of antigen, will give complete hemolysis.

Very often it is necessary to dilute the antigen, and when doing so, we have employed NaCl. 0.85 per cent.

Parallel with this titration with only antigen and complement must be carried on. The method is as follows:—

Antigen	1.5	.1	.8	.6	.4	.2	.1	.05
Compl.	.3	.3	.3	.3	.3	.3	.3	.03
NaCl.	0	0	.2	.4	.6	.8	.9	.95

After incubation for one and one-half hours, add hemolytic system.

Sheep Cells	.5	.5	.5	.5	.5	.5	.5	.5
Anti-sheep Amb.	.2	.2	.2	.2	.2	.2	.2	.2

RABBIT EXPERIMENTATION

Rabbits previously immunized with the human type of tubercle bacillus will withstand a lethal dose of bovine tubercle bacilli. With our antigens No. 1 and No. 2, we get a complete fixation with immunized, and also with non-immunized rabbits, while with antigen No. 3, only the immunized rabbits give us a positive fixation. This again brings up the question of the multiplicity of antigens. To my mind there is more than one anti-body present in the blood stream. One may be a simple anti-body reacting to protein antigen, while a second anti-body reacts to the lipoid antigen.

In the course of our studies, we find also that some patients give a positive fixation with antigen No. 1, and also with antigen No. 2; some patients give a positive reaction with No. 2, and not with No. 1: while still others give a positive fixation with only No. 3. What all this means, we cannot explain at present. After carefully studying the cases, and following them up for years to come, we may be able, in time, to draw some conclusions.

CLINICAL DATA

During the past few years we have made complement fixation tests on over one thousand cases. Out of these we have selected for this paper only 244 cases, for the reason that on them the test was made on more than one occasion. These 244 cases represent 563 individual tests, made at various intervals.

At present our method at the Sanatorium is to follow the cases and repeat the test every few months.

As I have already stated, no conclusion can be drawn at the present time.

Below is a table, giving a comparative study of the physical signs, the x-ray and the complement fixation:

Normals 14—all Negative.
Non-T. B. Diseases 14—1 Positive; 13 Negative.
Arrested 7—all Negative.

DOUBTFUL

20 Cases: 13 Positive.....65%
7 Negative.....35%

	Pos. T. B. Sput. 0		Neg. T. B. Sput. 32		X-ray Pos. 9		X-ray? 11	
Compl. Fix.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Number	00	00	13	7	8	1	5	6
Per cent	00	00	65	35	88.8	11.2	46	54

INCIPIENT

64 Cases: 52 Positive.....81.2%
12 Negative.....18.8%

	Pos. T. B. Sput. 19		Neg. T. B. Sput. 45		X-ray Pos. 56		X-ray? 8	
Compl. Fix.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Number	18	1	34	11	48	8	4	4
Per cent	94.6	5.4	74.8	24.2	84.5	14.6	50	50

MOD. ADVANCED

123 Cases: 112 Positive.....91%
11 Negative..... 9%

	Pos. T. B. Sput. 91		Neg. T. B. Sput. 32		X-ray Pos. 115		X-ray? 2	
Compl. Fix.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Number.	87	4	25	7	108	7	1	1
Per cent	95.3	4.7	78	22	93.9	6.1	50	50

FAR ADVANCED

2 Cases: Both Positive

COMPLEMENT FIXATION IN PULMONARY TUBERCULOSIS. SOME CLINICAL OBSERVATIONS

By Alfred Meyer, M.D.

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Numerous reports have appeared during the last few years upon the value of complement fixation in the diagnosis (or exclusion) of tuberculosis, especially the pulmonary form. The conclusions reached by various authors all seem to agree that there is *some* value in the test, both in confirming the existence of tuberculosis, either active or inactive, and in excluding it if the reaction is negative. There is, however, very considerable variation in the *percentages* of *reliable* results obtained in both positive and negative cases. This does not necessarily indicate the unreliability of the method, because it must be remembered that the different laboratory workers have employed different antigens, and for purpose of comparison the method used in all cases must be identical down to the minutest detail. At the same time, the widest publicity possible must be given to that method which seems to offer the highest percentages of reliable results so that the work may be repeated on the largest possible scale by many independent observers.

The object of this communication is (1) to give a short summary of work done on my cases this winter by Dr. H. R. Miller of New York with a new antigen, (2) to compare the results with similar work done by others and (3) to illustrate the practical value by a few detailed clinical histories. The serological work was done by Dr. Miller at the Bacteriological Laboratory of the College of Physicians and Surgeons, Columbia University, New York City. Up to the present time, he has examined the sera of a thousand cases obtained from many different sources. The material reported upon here was furnished by me from my service at the Bedford Sanitarium of the Montefiore Home, from my Tuberculosis and General Services at Mt. Sinai Hospital and from cases in my private practise.

The method used by Dr. Miller was recently described by him as follows:

"The bacilli which so far have been used for the production of the antigen have been of the human type, some of them isolated by Miller, some of them obtained from Professor Theobald Smith, some from the Laboratory of Professor William H. Park, and some from the laboratory of Parke, Davis & Co. They have been grown mainly on the gentian violet medium of Petroff, and on Miller's modification of this medium; also on Petroff's potato broth. It is at present the impression of the writer that the medium on which the bacilli are grown, plays no great part in determining the usefulness of the antigen. It seems however, to be important that a number of different strains should be used,—that is, that the antigen should be polyvalent,—and the use of relatively young cultures is advisable. So far, in most

of the reactions, unheated bacteria have been used.* Inasmuch as the method of production, under these circumstances, is fraught with a not inconsiderable element of danger, we have recently begun to use bacteria heated to 60 degrees for a half hour, and in the one series so carried out, no deteriorating effect of the heating was apparent. These problems of detail, as well as many others, are being thoroughly investigated.

"20 mgm. of the moist tubercle-bacillus mass was weighed out, placed in a conical 15 c.c. centrifuge tube, and to it are added 90 mgm. of table salt. With a glass rod filed to roughness at the end, this paste is ground by hand for about one hour. Distilled water is then added to isotonicity; that is, 10 c.c. to the quantities above described. This is the antigen. Just before using it, it is shaken up and the heavier particles are allowed to settle in the course of a few minutes. Except for the removal of these larger elements, the suspension is used as a whole without centrifugation and without filtration.

"The antigen so prepared has hardly ever been found anti-complementary in quantities as large as 1 c.c. and has given fixation with positive sera (the sera used in quantities of 0.1 c.c.) in amounts as low as 0.02 C/C/. The titrations as well as the reaction have been done with one half the original Wassermann quantities, using a sensitization of two units of amboceptor and two units of complement. So far we have used the anti-sheep rabbit hemolytic system. As a routine, the 37 degrees one-hour water-bath incubation has been employed. A number of parallel series have been done by the four-hour ice-box method, but since this seems to make little difference in the results, the time-saving 37 degree method was decided upon as a routine procedure. The antigen appears to be quite stable. We have used with satisfaction antigens as old as six or seven weeks kept on ice."

SUMMARY

Of 48 cases with positive sputum, all but two reacted positively equivalent to 96 per cent.† This result is even more favorable than appears on the surface for one of the two exceptions A.W. had had negative sputum for seven months (18 examinations), had gained 33 pounds and was in all probability an arrested case. The other exception H.S., was also in all probability an arrested case, having been afebrile for a year, and having gained nearly 18 pounds.

It is necessary to go a little more into detail with regard to 15 strongly suspect cases with negative sputum that reacted positively. The sputum in these cases had been examined from three to thirty times, some with antiformin.

The group of cases in Table I, not proven bacteriologically, represents a very common type for which clinicians are seeking additional reliable aid for a correct conclusion; and this need applies both to cases in which the interpretation of undoubted physical signs is uncertain, and to suspect cases without any physical signs at all, or is needed to corroborate exclusive skiagraphic findings, or to act as substitute for skiagraphic evidence if this is not available. Every one of the above cases with the exception of S.S. justified the positive complement fixation test, either from the clinical or skiagraphic point of view, equivalent to 93 per cent. S.S. had a positive Wassermann and although he had x-ray findings that might have justified including him among the proven tuberculosis cases, it was thought wise to exclude him for reasons which will appear later under my remarks on syphilis.

The case of G.F. is of especial interest because of the original x-ray

* This applies to all my cases.

† NOTE: In a few of these cases the sputum was only found positive subsequent to the serological test.

TABLE I

Case	Age	Clinical Diagnosis	Von Pirq.	X-ray	Comp. Fix.	Remarks
M. A.	34	Doubtful Pulm. tbc.	Pos.	Thickened left pleura.	+++ 10 wks. later neg.	
H. B.	20	Pulmonary tuberculosis		Typical tbc. bilat.	Feb. ++++ April +	Always afebrile 8 sp. exam. *Wass.* neg.
L. D.		Bilat. apic. tbc.	Pos.	Infilt. both apices.	+++	Afebrile
J. F.		Slight rt. apic. tbc.			++++	30 sputa. 3 laryngeal
G. F.		Consolidation rt. upper lobe.	Sl. Pos. & Neg.	Tumor? Aneurysm?	Feb. 12 ++++ Feb. 24 ++++ Apr. 25 Neg.	Wass. neg. 16 sputa. (More details in text.)
D. G.	19	Pulmonary tbc. rt. cavity.		Rt. tbc.	+++	19 sputa. Guinea-pig inoc: no tbc. Febrile.
J. G.	56	Slight old mitral stenosis; pleural thickening.		Rt. apic. tbc. Pleural thickening	+	Recurrent hemoptyses.
A. H.		Doubtful tbc.	+ ±	No definite evidence.	+	Afebrile; probably arrested case.
H. I.	64	Doubtful tbc.	+ ±	Bilat. chron. opic. tbc.	++ Same ++++ date	Afebrile; recurrent sl. hemopt. 5 yrs.
D. M.	50	Pulmonary tbc. suspect for 8 yrs.	Neg.		++	Subfebrile.
J. S.	15	Hodgkins?		Old lesion l. apex. Bron. nodes, large.	+	Path. ex. gland; tbc. adenitis.
R. S.	31	Bilateral apical tbc.		Marked bilat. fibrosis.	+	31 sputa. Febrile many weeks. Guinea-pig, neg.
S. S.		Doubtful tbc.		Sl. dense rt. apex; peribron. infiltration.	++	Admits lues; Wassermann posit.
A. U.		Doubtful tbc.	Pos.	Sl. infilt. left apex.	+++	9 sputa.
I. W.		Doubtful tbc.	Pos.	Pulm. Cavity.	+	Afebrile. Only 3 sputa obtainable.

diagnosis, the von Pirquet findings and the change from two four-plusses to negative. It must be stated however, that he had had a tuberculin injection of 0.005 with marked febrile reaction on Feb. 2nd, 10 and 22 days respectively, before his two positive complement fixation reactions. As has been shown by Citron, tuberculin injections may cause the appearance of antibodies in the serum, which soon disappear. The subsequent course of this case, clinically and skiagraphically, indicated that his condition was one of chronic fibrosis with bronchiectases, and the suspicion is confirmed that the first and second positive complement fixation reactions were due to the tuberculin injection and that he had no active tuberculosis.

In two of the cases, M.A. and H.B., a decrease in complement binding corresponded strikingly with clinical improvement. I leave it an open question whether there is any relationship between these two facts, and therefore of its prognostic significance; this can only be decided after the accumulation of a very large number of observations.

I wish to report also 22 cases of various diseases with negative reaction.

An analysis of Table II shows that in at least 15 cases out of the 22, equaling 68 per cent., the negative complement fixation agreed with the clinical findings.

Of the remaining 7, M.J., L.K., F. P., and S.S.W., if ever tuberculous, were apparently healed cases; hence we may reasonably include them among the cases in which a negative complement fixation reaction is reliable, which increases the percentage to 86. In three cases, however, M.K., J.R. and R.Z., the serological findings are not absolutely acceptable. M.K. and J.R. are sufficiently explained in the table.

The case R.Z. was a young girl of 19 years whose first hemoptysis had occurred nine years before, after falling down stairs (traumatic tuberculosis, so-called?); again hemoptysis four years before and two weeks before admission to my service at Mt. Sinai Hospital. According to her story, all these hemoptyses had been very large. While under my observation, she had fresh hemorrhages on eight different days, as much as 11 ounces on one day and totalling about 23 ounces, finally necessitating the induction of an artificial pneumothorax on the right side. The selection of the side for lung compression was somewhat difficult because there had been a complete absence of physical signs, with the exception of very slight crepitation on that side in the axillary region, and at that time radiography was not advisable because of the hemoptyses. From that date on, now five months ago, there has been no recurrence of bleeding and she is much improved in general health; she has no cough, no expectoration, has gained a great deal in weight and a guinea-pig inoculation with the blood proved negative, so I am still in a quandary as to the nature of her case.

In discussing tuberculosis complement fixation in his recent work on "Pulmonary Tuberculosis," Fishberg says, "Most writers obtain positive reaction in patients with syphilis." On the other hand, Craig (*Am. Jr. Med. Sci.*, Dec., 1915) has reported that out of 150 syphilitics examined,

TABLE II

Case	Age	Clinical Diagnosis	Von Pirq.	X-Ray	Remarks
A. B.		Chr. Bronch; polycythemia.	Pos.	Infil. both upper lobes.	Afebrile; 5 sputa.
A. B.	20	Pleurisy with effus.	Neg.		Guinea-pig negative.
P. C.	36	Lues Indefinite apical signs			Wassermann ++++
M. E.	50	Diabetes	+		Retraction apex, percussion neg.
A. E.	50	Chr. Nephritis	± Sl.		Febrile.
J. F.		Pleuro-pneumonia with serous effus.	+ ±		Temp. 106°
A. H.	42	Pyopneumothorax	Neg. Neg.		Guinea-pig negative. Operation; death.
M. J.	43	Duodenal Ulcer healed tuberculosis			Suspect tbc. 14 years before.
M. K.	37	Spontaneous pneumothorax (right)		Probably old left apical lesion, rt. pneumothorax.	Afebrile Wass. neg. P. 80–92, R. 20–24.
L. K.		Infiltration both apices, pleurisy both bases.			7 sputa neg. Always afebrile; gained 23 lbs. in 9 wks.
J. L.	21	Sexual neurasthenic.	Pos.	Negative.	
O. L.		Post-pneumonic pleurisy.	Neg.	Infiltration rit. base.	Afebrile.
I. L.		Chronic nephritis and uremia.	±		6 sputa neg. one antiformin. Death.
F. P.	17	Mitral lesion, well compensated. Tbc. suspect.	Neg.	Calcareous bronch. lymph nodes.	Afebrile.
L. R.	49	Malignant tumor testicle.			Confirmed by operation
J. R.	43	Pulm. abscess; rapid cavity formation.	Neg.	Neoplasm?	Wassermann neg. Sputa (14) neg. Once, 2-acid fast bacilli. WBC 29000.
M. S.	28	Phthisiophobia: slight nephritis.		Negative.	6 sputa negative; 1 antiformin.
I. S.	34	Old pneumonia; pleural adhesions.	Neg.	Shadow left base; cause uncertain.	Afebrile. Wassermann negative.
A. S.	40	Carcinoma of stomach.	Neg.		Wassermann negative.
S. W.	38	Chr. nephritis; chr. endocarditis; lues.			Wassermann ++++
S. S. W.	41	Old pleurisy; healed tuberculosis.		Peribronch. infiltration; calcareous bron. nodes; slight infiltration apices.	Question of permitting marriage.
R. Z.	19	Doubtful pulm. tbc	Pos.	Dense, irreg. shadows around hilus and in 4th r't interspace. Great number dilated bronchi.	Repeated hemoptyses.

only two cases gave positive tuberculosis complement fixation and in those two the symptoms of a coincident tuberculous infection were present. My own series shows two cases of syphilis, P.C. and S.W. (Table II) each with Wassermann four plus and each with negative tuberculosis complement fixation. On the other hand, S.S. (Table I), a doubtful tuberculosis, admittedly luetic, had a positive complement fixation, but also a positive Wassermann and x-ray findings that might be interpreted as confirmative of either or both of these diseases.

In a verbal communication, Dr. Miller tells me that he has examined 54 other cases with positive Wassermann and they were all negative for tuberculosis with his antigen, with the exception of one case, which was positive, and proved to be complicated by tuberculous peritonitis. This evidence strongly supports the view that with this antigen there is no confusion between the two tests, but that a positive tuberculosis complement fixation in a luetic is simply proof of the coexistence of the two diseases.

The limited time at my disposal precluded my going extensively into the literature of the subject. Radcliffe (*Jour. Hygiene,* Cambridge, 1915, XV) had 89 per cent. positive results in 568 cases in all stages of pulmonary tuberculosis. In 11 cases other than tuberculosis, mostly malignant growths, all were negative. In 20 suspect cases with negative sputa, 75 per cent. were positive. Forty-five apparently normal individuals, examined on 204 occasions, were invariably negative.

Craig (*Am. Jour. Med. Sci.,* Dec., 1915) found 96 per cent. of positive reactions in active tuberculosis and 66 per cent. in inactive. The test was negative in normal individuals and also in patients suffering from other diseases.

Baldwin, of Saranac Lake, in a private communication, reports 56 per cent. positive in 32 suspicious cases and 90 per cent. positive in ten known first stage; 25 per cent. positive in 32 healed cases, from four months to ten years. He also makes the remarkable statement that there were 30 per cent. positive in 20 supposedly healthy persons who had been long exposed to tuberculosis.

In conclusion, I would say that in my judgment, the evidence offered by my cases, examined with Miller's antigen, compares most favorably with the results obtained elsewhere with other antigens; that it is in all probability no exaggeration to say that the method equals in value the Wassermann test for syphilis. It is most important that complement fixation tests, with Dr. Miller's antigen, be made on as large a scale as possible in sanatoria and, so far as practicable, in private life.

DIAGNOSIS OF TUBERCULOSIS BY COMPLEMENT FIXATION TEST *

By J. Bronfenbrenner, Ph.D., and M. J. Schlesinger

Pittsburgh, Pa.

The peculiar chemical properties of the tubercle bacillus have rendered it a difficult task to get reliable results by means of the complement deviation test, owing to the fact that the preparation of the antigen was fraught with many complications. Recently, however, Besredka cultivated the Koch bacillus on an entirely new medium. In studying the antigenic properties of his cultures, Besredka found that they may be successfully used for the complement deviation test.

We have been studying this subject very extensively and, although we found that the complement deviation test with Besredka's tuberculin is very useful in the majority of cases, it had certain properties which may lead to obtaining non-specific results. Our general conclusions are as follows:

Different samples of tuberculin of Besredka, although apparently identical in the mode of preparation, may differ in their respective specific values. Thus different samples were found to vary in the amount of lipins they contained.

It is necessary, therefore, to free each sample of tuberculin of all its lipin fraction, before using it for the complement deviation test. The lipins may be extracted by fat solvents, but the easiest method was found to be the separation of the protein fraction by precipitation. This method offers also the possibility of using a standard number of units of antigen, and so eliminates variations in the amount of specific constituents in different samples of tuberculin, without increasing the chance of obtaining lipotropic reaction.

It seems, however, that different samples of tuberculin may also vary qualitatively, even after removal of lipins. This is apparently due to the existence of strain specificity in the antibody. The existence of strain specificity in tuberculosis may explain why the results obtained by different investigators in the complement deviation test for tuberculosis vary so much.

Tuberculin of Besredka seems to give very good results in diagnosis of tuberculosis by complement deviation test. Even though the test is positive in a certain number of clinically nonsuspected cases, the reaction seems to be specific. At least in 87 per cent. of such cases, the fixation

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was also obtained with one or more tuberculins other than that of Besredka.

In a series of cases reported previously, we noticed that the occurrence of the complement fixation with tuberculin of Besredka as an antigen is considerably higher among the individuals infected with syphilis than among individuals free from this disease. Whereas, the occurrence of positive reaction among nonsyphilitics in our series amounted to only 23.1 per cent., we found the recation to be present in 43 per cent. of syphilitics. Moreover, in studying the occurrence of the reaction in individuals free from clinical symptoms of tuberculosis at the time of examination, we found that among nonsyphilitics the test was positive in 5.6 per cent. of cases, whereas among syphilitics of the same group the reaction was present in 20.3 per cent. of cases.

These findings lead us to conclude that syphilitic infection as such, or the antisyphilitic treatment, render the patient less resistant to subsequent infection with tuberculosis, or at least renders him less resistant against the progress of tuberculosis previously contracted.

Such a conclusion although apparently in accord with clinical observations of such men as Fournier, C. F. Marshall, Douty, F. H. Andrews, Sir Jonathan Hutchinson, and others, was recently doubted by Craig (*American Journal of the Medical Sciences,* 1915, Cl. 781). This author found that the occurrence of tuberculosis among syphilitics as judged by the complement fixation test was less than 1 per cent. Taking into consideration that the occurrence of tuberculosis among all individuals in whom tuberculosis is not suspected clinically is equal to 9.7 per cent., according to our findings, this figure obtained by Dr. Craig is exceedingly low. This apparent difference can be explained very easily, however, if one realizes the difference in the material used for our respective studies.

In our own series we dealt with men or women of all ages, mostly working people, greatly exposed to infections in general and tuberculosis in particular. Craig's material consisted of a group of men who must have been comparatively free from tuberculosis at the time of admission to military service, and who, having been admitted to service, were placed in conditions of life exceptionally favorable for assisting the person in resisting any possible new infection.

We therefore think that our earlier conclusion about the frequency of occurrence of tuberculosis among syphilitics is correct if the patients are not taken from any special group like those of Dr. Craig.

DISCUSSION ON PAPERS BY DR. CORPER, MR. PETROFF, DR. MEYER, AND DR. BRONFENBRENNER

Dr. E. R. Baldwin, Saranac Lake: So far as this question is concerned I am only going to say just a few things and try to, perhaps, present the clinical side and the laboratory man's side together. In other words, possibly you might like to know what the man who has made some observations on both sides might feel as to the practicability of this

method of examination of patients, whether for diagnosis or prognosis.

This thing has been before the laboratory men for a good many years, and has been a complicated subject. It has been so complicated, for reasons which Dr. Meyer has given, and the difference in antigens has a great deal to do with it. The thing that always impressed me about the whole work was, that until we had an antigen that could be made stable and prepared in quantities to give us the same material to use a long time,— or at least be able to prepare the same material exactly as it was first prepared,— we would not be doing very much good by going on with clinical observations because they could not be compared.

Mr. Petroff knows very well the position I took in regard to the work when he was making this very interesting antigen preparation. I warned him that if he wanted to have me get some serum for him he was to have *one* antigen or a dozen mixed, but have enough so that he could do a long series without interruption. He prepared a filtrate out of the broth. To me, it has very many advantages. First, because it was not altered by heat, an idea which he himself suggested as possibly giving the best results. These are technical matters, but finally he prepared it out of a number of strains of bacilli. He succeeded with this in obtaining 85 per cent. of positive results, in round numbers,— possibly 87 per cent. When he found that this was going on pretty well I became a little interested; Dr. Brown also.

I had some opportunity to make observations on both healthy and diseased people who came to me for diagnosis; others came to me regularly. But what interested me more were people who had not been known to be tuberculous, but were in close contact with such, e.g., husbands and wives of patients. We had quite a series of them — but I haven't any figures now. The interesting thing in another series was that we had a good many doctors and others who had formerly been patients but now supposed to be perfectly well and in active life who offered very good opportunities for the study of this reaction. We knew they had had tuberculosis and the question was whether this serum reaction could still be obtained. I may say it was very interesting to show that our clinicians have, by their so-called,— we might say, almost empirical methods of observation,— shown how accurate they are, because two years seems to be about the time that the serum will lose its positive reaction after recovery from tuberculosis.

Physicians have told us that we should not tell people that they are arrested until after two years freedom from symptoms. I think this serum work is a compliment to their erudition. Up to two years a positive reaction seems not to be a very valuable evidence of anything but the fact that they are still showing some of the antibodies in the serum which existed during the active stage of the disease. Nevertheless, so far as I have been able to observe in my own experience, it is not a criterion of activity or non-activity of the disease, but our observations confirm what Dr. Meyer said of the gradual loss of positive reaction, where the patient is improving or during convalescence, and goes to

show that it does decrease in strength and disappears finally in the majority of cases.

As to figures, Mr. Petroff has not given those of the totals now, but it seems to me hardly worth while to present figures or percentages until we know more about it. As a diagnostic criterion it has not appealed to me, but as a confirmatory test it has been well worth while. As to the availability of this test to the average sanatorium, I might say that any sanatorium with a small laboratory and somebody with the time ought to be able to carry it on, but it ought to be systematized so that many tests may be made at one time.

Dr. Lawrason Brown, Saranac Lake: It is very tempting to a physician to form some sort of a hypothesis based on these new tests, that Dr. Baldwin says may not be of very great practical value, and I am going to give you a few suggestions which relate to the cases which I have had under my care: doubtful cases, and those with arrested, quiescent or active disease. It seems to me that all the cases of active disease should give a positive reaction to the complement fixation test if it is going to be of any clinical value. It seems to me that in studying the cases, the only ones that are really of very great importance are the active cases, because in the others we can't tell whether or not some small focus may not be active, small enough possibly not to give any clinical symptoms whatsoever. All of you know that when we send some arrested cases home they relapse so quickly that we must feel sure that they were not arrested and not even quiescent. Of the non-tuberculous cases I had only five, and three of those were negative and two were positive, and those two I think were more or less doubtful cases. One, a man with a diagnosis of tumor of the lungs, died in Buffalo and we were unable to get an autopsy. Of the arrested cases we had seven so-called apparently clinical arrested cases. Four were negative and three positive. One patient, a man who came up with practically no physical signs, developed a few as he got better. He was remarkably well and strong. As time has gone on his reaction has fallen from four plus down to three plus, and the last time one or two plus.

Of the quiet cases there were nineteen; thirteen were positive and six negative. The last and most important, of course, is the active group. Of these I had eleven cases and ten of them were positive and one was negative, but that one, I might say, did not have the last antigen tested on him. Had that been tried he too I believe would have been positive.

Dr. Clarence Wheaton, Chicago: We are greatly indebted to Dr. Corper for his valuable contribution to the subject of complement fixation, and also to Dr. Craig of the Army who has written extensively on this subject and done much original work.

A number of cases of positive complement fixation have been referred to me during the past year for chest examination. It so happened that in the examination of the cases referred the chest findings were definitely tuberculous in most of the cases.

I believe the complement fixation test is of practical value as applied to

tuberculosis, and will find a large field of usefulness in applying it to those so-called quiescent cases, largely as a control, in determining the possibility of future clinical activity in these apparently arrested cases. As a diagnostic measure the complement fixation test may prove of greater value than tuberculin.

Dr. Corper: I have just a few points I wish to make regarding tuberculosis antigens, and especially the autolysate antigen. The autolysate antigen has a wider range between its anticomplementary dose and antigenic unit than any of the tuberculosis antigens thus far described; for instance, an antigen which gave complete fixation in 0.001 cc. was not anticomplementary even in 0.8 cc. amounts using the Noguchi hemolytic system. The autolysate antigen is a rather striking material since it is perfectly clear and has generally a slight yellow tint.

In our experiments there were noted a number of sera which gave complete fixation with any antigen tested in spite of the fact that the controls were always negative. This phenomenon has not been accounted for as far as I am aware. It lowers the percentage accuracy of any fixation test.

It is not clear to me exactly what Dr. Petroff's antigen can be. It seems to be a mixture of lipoids and proteins. I should like to know which Dr. Petroff considers it.

The original experiments carried out with the autolysate antigen were with one strain, and, as stated in the paper, the efficiency was about 30 per cent. Later two strains were tried and in these experiments, several hundred tests having been performed thus far, the efficiency was increased from 45 per cent. with one strain in this series to 57 per cent. with the two strains. At present tests are being carried out with about a dozen strains. If corresponding increases occur with the addition of more strains, and all present day scientific data seem to indicate this, then probably an 80 per cent. efficiency will eventually be attained equivalent to that in the Wassermann reaction for lues.

In reply to Dr. Lewis' question as to whether it would be advisable to do complement fixation tests for tuberculosis in his laboratories, I would say that at the Municipal Tuberculosis Sanitarium we do Wassermann and gonorrhœa fixation tests as a routine, and in addition a number of tuberculosis tests both for anti-body and antigen on each blood. If the Wassermann test is carried out the remainder can be added without the consumption of a great deal of additional time.

In conclusion I wish to bring out one very important point that I think every clinician and physicians in general should appreciate, and which was suggested by Drs. Wheaton and Brown. That is, that we laboratory men do not wish to make the diagnosis; it is practically impossible for us to do so. It is expecting too much from us. We can aid the clinician in making a diagnosis and usually can swing the evidence in one way or the other. We can give you information, but the responsibility of making a diagnosis lies entirely upon the man who has the case. Therefore, the important factor is to train the clinical man to

be able to interpret and appreciate the value of these different laboratory tests.

Dr. Meyer: I agree absolutely with what we have just heard from Dr. Corper, that we physicians should not depend in this field of work any more than in any other field of medicine exclusively on the laboratory. We all know there are very few who are capable of giving us a true diagnosis. We should not accept any one single clinical fact as absolute, but should reach a conclusion, so far as possible, with our intellect and judgment and powers of perception, and throw out the unimportant things and forge a chain made up of a great many links.

Now, I do feel that the experience I have had this winter would indicate that the complement fixation test is not sufficiently appreciated, and that so far as possible, the sanatoria of the United States should have at least one trained man on their staff, in order to introduce a very large amount of testimony, by making a test, on a very large number of cases, so that within perhaps two, three, four, or five years we may have a definite answer as to how strong this link is. Advance information rather points to the conclusion that it is going to be of great value.

In conclusion, I not only advise this, but at the Bedford Sanatorium and the Montefiore Home I urged the Board of Directors to give a long leave of absence to a member of the House Staff to permit his working in the bacteriological laboratory of the College of Physicians and Surgeons of Columbia University, and we expect to keep him there long enough so that he will be able to do all his work at Bedford in place of sending the blood or serum to New York.

I strongly urge upon all of you to try and follow this method in your practice.

ATTEMPTS TO ALTER THE RESISTANCE OF GUINEA PIGS TO TUBERCULOUS INFECTION AND EXTENSION BY ANAPHYLACTIC SHOCK

By Allen K. Krause, M.D.

Saranac Lake, N. Y.

The main purpose of this work was to try to create conditions under which strains of tubercle bacilli and non-pathogenic acid-fast bacilli (Bacillus Mist) would set up more widespread pathological alteration in the animal body than under ordinary circumstances.

The tubercle bacilli used for infecting the guinea pigs were those of the R 1 (Saranac Laboratory) culture. This culture was isolated in 1891 from a case of human pulmonary tuberculosis. For a number of years it has remained constantly of low virulence. If injected subcutaneously it will not produce progressive, fatal tuberculosis in guinea pigs. Under these circumstances gross tuberculous changes as a rule will not advance beyond the regional glands, no matter how long the animal is allowed to remain alive.

As is well known, subcutaneous inoculations of the Mist Bacillus, even in relatively enormous doses, produce as a rule only abscesses at the site of inoculation with perhaps some hyperplasia of the regional lymphatic glands. These lesions rapidly subside and after a few weeks the tissues concerned return to their normal state.

The following experiments were therefore an effort to alter the resistance of the infected animal so that a germ of feeble parasitism could manifest a more invasive capacity than under the usual conditions of experimental infection. The experiments fall under four heads, as follows:

Experiment 1.— Plan: To sensitize normal guinea pigs with tuberculo-protein. Several weeks after sensitization to produce in them non-lethal anaphylactic shock with the same protein. While they were still suffering from the symptoms of anaphylactic intoxication to infect them with the R 1 tubercle bacillus of low virulence. To note the effects of R 1 infection as compared with the same infection in previously normal animals.

Experiment 2.— Plan: To sensitize normal guinea pigs with tuberculo-protein. After sensitization was established to infect them with R 1. After disease is established to give the originally sensitized animals non-lethal anaphylactic shock and study the effects of anaphylaxis on the tuberculous disease already present.

Experiment 3.— Plan: Exactly the same as that of Experiment 1 except that for purposes of infection Moeller's Mist Bacillus was used instead of R 1 human tubercle bacillus.

Experiment 4.— Plan: To inject normal guinea pigs subcutaneously with large doses of dead tubercle bacilli which when living were virulent. Ten days after this injection to inoculate the same animals with living R 1 bacilli and compare the resultant lesions with those in normal animals inoculated similarly with the R 1 culture. The first injection was made with H37 bacilli, a strain which for ten years we had always found would produce progressive disease in guinea pigs. In this particular instance the bacilli had been dried *in vacuo* from fifteen to seventeen months before injection and had since been kept in the dark. They were presumably dead, and, since they had not been subjected to heating or to chemical agencies, they had apparently not undergone any physical or chemical alteration. In this experiment we desired to see whether the initial injection of large quantities of dried, unaltered, tubercle bacilli would so alter the animal body that a subsequent inoculation of living bacilli of low virulence would produce more widespread disease than under more normal conditions of infection.

RESULTS OF THE EXPERIMENTS

Experiment 1: The difference between the test animals and the controls were not clear cut. All in all there were suggestions that of those animals that were suffering from anaphylactic shock at the time of inoculation with R 1, the greater number had perhaps somewhat more advanced disease than the majority of the normal controls.

Experiment 2: There was no appreciable difference between the lesions in the test animals and those in the controls.

Experiment 3: Test animals and controls showed essentially the same degree of involvement.

Experiment 4: An initial injection of dried H37 culture apparently did not reduce the animals' resistance to a subsequent inoculation of slightly virulent R 1 tubercle bacilli.

SUMMARY

1. Anaphylactic shock, experienced by guinea pigs a short time before infection with tubercle bacilli of low virulence, did not reduce their resistance to such an extent that the parasitism of the particular microorganism concerned was markedly increased although there were suggestions that the extent of disease was probably increased.

2. If tuberculous disease of low grade is once established in guinea pigs a single attack of anaphylaxis does not bring about conditions that favor the extension of the disease.

3. Anaphylactic shock suffered just before the inoculation of a nonpathogenic acid-fast organism, the Mist Bacillus, does not lay the body open to progressive invasion by this germ.

4. No success attended the effort to enhance the virulence of a strain of tubercle bacillus (R1) by a previous injection of dead, virulent tubercle bacilli (H37).

EXPERIMENTAL STUDIES ON CUTANEOUS HYPERSENSITIVENESS TO TUBERCULO-PROTEIN

By Allen K. Krause, M.D.

Saranac Lake, N. Y.

This was a detailed study of the variations and fluctuations of skin hypersensitiveness in animals (guinea pigs) that had been experimentally infected with tubercle. The reactions were observed and measured in two different sets of animals. One series was infected with R 1 tubercle bacillus, a micro-organism of low virulence which produced self-limited, healing disease. The other series was inoculated with H37 tubercle bacillus, a germ of ordinary virulence, which produced progressive tuberculosis in the animals.

Observations were begun on both lots of guinea pigs eleven days after infection. On the R 1 animals they were carried on over a period of 669 days; on the H37 animals, for 46 days, when these animals began to die off.

The antigen used for the skin test was always the same water-extract-filtrate of dried, pulverized H37 tubercle bacilli. It was always given intracutaneously in the same dosages, 0.2 c.c. of a solution of the water-extract diluted 1 to 1 with 0.85 per cent. sodium chloride solution. Every dose always represented 0.002 gramme solid substance.

The results of this study may be summarized as follows:

1. Cutaneous hypersensitiveness to tuberculo-protein is inaugurated by the establishment of infection and the development of the initial focus.
2. It increases with progressive disease.
3. It varies directly with the extent and severity of the disease.
4. It diminishes with the healing of the disease.
5. It is probably never entirely lost (in the absence of intercurrent disease, pregnancy, etc.).
6. It is increased by re-infection.
7. It is diminished or completely wiped out during the period of a general tuberculin reaction.

SOME UNUSUAL CONSEQUENCES OF ARTIFICIAL PNEUMOTHORAX

By Allen K. Krause, M.D.

Saranac Lake, N. Y.

The series of cases herein reported, brings together the clinical and autopsy sketches of five patients who were given artificial pneumothorax for pulmonary tuberculosis. Four of these come properly under the title of this paper, for in all four spontaneous rupture of the lung was found at autopsy. The fifth is included because the patient received intrathoracic injections of nitrogen over a period of almost four years, and it was of interest to note the condition of the collapsed lung after this period. The cases were in the services of Drs. Lawrason Brown, Baldwin, Kinghorn and of the Trudeau Sanatorium to whom acknowledgement is due.

Case I: Female, aged 26. Symptoms of active pulmonary tuberculosis for twenty months when lung was compressed in November, 1911. Temporary amelioration of symptoms. Periodic nitrogen injections from November, 1911, to January 4, 1913. On the latter date, 250 c.c. were given and shortly afterwards the patient complained of sharp pain on the side of the collapsed lung and wheezing. The temperature rose and amphoric breathing was noted for the first time. Fluid developed in the chest and on January 26 pus was aspirated. This contained large quantities of tubercle bacilli. The patient went steadily down hill and died on February 3, thirty days after the last injection of nitrogen.

At autopsy it was found that the right (collapsed) lung was greatly reduced in size, shrunken, tough and leathery. Numerous band-like adhesions ran from the upper part of the lung to the chest wall. For the most part these were very heavy and were stretched taut. The upper half of the lung tissue was replaced by a large cavity. Along the outer border of the surface of the lung were two small slit-like holes that communicated with the bottom of the cavity. The anatomical diagnosis was pyo-pneumothorax following ruptured lung. In its lower part the lung was thoroughly atalectatic and indurated, and showed a great increase in fibrous tissue which ran in bands and lines in the direction of the long axis of the lung and which was altogether apart from that fibrous tissue that represented the scarring of old tuberculous foci. It seemed almost impossible that the lung could have re-expanded after this time, had occasion occurred.

(This case has been reported at greater length by Brown and Krause, Transactions of Association of American Physicians, 1913.)

Case II: Male, aged 27. Acute pulmonary tuberculosis, running a febrile course from May 12, 1914, to January 4, 1915. Given a total of 27 intra-thoracic injections of nitrogen from January 4 to November 22, 1915. Complete collapse of the left lung obtained with some alleviation of symptoms. About the beginning of December, 1915, pain and dyspnœa developed and increased, and after physical examination a diagnosis of spontaneous pneumothorax was made. Patient sank gradually and died January 4, 1916. Duration of artificial pneumothorax, eleven months.

Autopsy: The left thoracic cavity contains 250–300 c.c. of dirty, turbid, grayish-green fluid. The left lung is compressed into the vertebral gutter, more completely below the fourth rib and less so above the fourth rib, leaving the greater part of the pleural cavity free and empty. As the lung lay in position before being touched, it was noted that there were two small, oblong holes, each about 2 mm. in diameter, through the enormously thickened pleura. These holes were in the upper lobe near the apex, and on the anterior surface near the axillary border. They were between dense, finger-like adhesions that tied the lung to the thoracic wall. They communicated with a very large cavity that filled the upper lobe. The lung was much shrunken and leathery. A cavity had excavated the entire upper lobe. The remainder of the lung was converted into hard, compact tissue, the markings taking a more or less cranio-caudal direction. To the naked eye it did not appear that much fibrosis had occurred: at least there was an absence of grayish, translucent lines on the cut surface.

Anatomical Diagnosis: Pyo-pneumothorax following rupture of the lung.

Case III: Male, aged 21. Symptoms of pulmonary tuberculosis began with hæmoptysis after exertion in August, 1914. Admitted to Trudeau Sanatorium, September 21, 1914: symptoms and signs slight. Beginning on October 29, 1914, for several months the patient had increasingly frequent hæmoptyses and continually streaked sputum. The disease developed a more and more florid course. On June 2, 1915, at the patient's request he was given 350 c.c. of nitrogen gas intrathoracically on the left side. The patient felt quite well and comfortable until two o'clock P. M., the next day, when he raised himself in bed and felt a sharp stabbing pain in his left side. He soon went into a condition of shock with nausea and vomiting. He became rapidly worse and at 6 P. M. blood was withdrawn from the chest upon thoracentesis. Died at 4:15 A. M., June 4, 1915, fourteen hours after the onset of his acute symptoms and about thirty-six hours after a first, single injection of 350 c.c. of nitrogen.

Autopsy: The left thoracic cavity contains at least 2000 c.c. of clotted blood. There are no evidences that the left lung had been punctured by the needle used to administer the nitrogen. The lungs are unusually free from adhesions except at one point. Proceeding directly forwards from the anterior border of the lung, about 4 cm. above the caudal tip of the

upper lobe of the left lung is a short, very dense and thick adhesion. This was cut through when the costo-sternal plate was removed. It is very short and projects only about 3 cm. beyond the anterior border of the lung. It is band-like, and measures 10 mm. in breadth. It was evidently attached to the chest wall near the costo-sternal border. On the anterior surface of the lung, 5 mm. from this adhesion is a small hole about 2 mm. in diameter in the center of an umbilicated area that is about 8 mm. in diameter. No other tears of the lung are to be observed. This opening leads directly into a small, sub-pleural vomica that is about the size of a cherry. In its neighborhood the tissue covering the vomica is reduced to the thinness of the most tenuous tissue paper. There is little doubt that here the lung ruptured *intra vitam* and that hemorrhage and pneumothorax resulted. The rest of the lung shows a condition of phthisis florida with numerous small, fresh cavities, most of which are sub-pleural and in the lower lobe.

Anatomical Diagnosis: Hemo-pneumothorax following rupture of the lung.

Case IV: Male, aged 41. First consulted Dr. Brown on December 18, 1913, with a clinical history of having had a "cold" in September, 1913, which he had been unable to shake off. Physical examination revealed advanced pulmonary tuberculosis. Patient was put to bed but grew rapidly worse. On February 20, 1914, his left lung was first collapsed with nitrogen gas. On the third injection he complained of a sharp pain near the needle entrance. On March 5 there was some fluid present in the chest. On April 16 fluid was present to the seventh rib. On April 25 the patient suddenly began to expectorate foul-smelling, green sputum and filled five or six sputum boxes with putrid material — 20 to 24 ounces. This condition continued but the expectoration lessened in amount to about eight ounces a day. Fever was irregular, at times as high as 103°. The pulse was rapid and intermittent. A metallic tinkle was heard over the left side, but no breath sounds. There was also a moderate amount of effusion. The patient became progressively worse and died on May 15, 1914.

Autopsy: On the left side there was tremendously thickened pleura, both parietal and visceral, with many enormous adhesions. The pleural cavity contained about 1000 c.c. of brown, putrid fluid. The entire lung was in a condition of gangrene with numerous, large holes communicating with the thoracic cavity.

Anatomical Diagnosis: Gangrene of the lung with pyo-pneumothorax.

(This case has been reported in detail by Packard, *American Journal Medical Sciences*, 1916, CLI, 887).

Case V: Female, aged 26. Onset of symptoms, December, 1909, while nursing an infant. First consulted Dr. Baldwin on May 22, 1910. Had moderately advanced pulmonary tuberculosis with laryngeal tuberculosis. Her condition became progressively worse and as a last resort artificial pneumothorax was first induced on the left side on March 5, 1912. After a few months her condition became better and from April,

1913, to April, 1915, it was that of chronic, quiescent disease. Between March 5, 1912, and April 24, 1915, she received at regular intervals a total of 86 injections of nitrogen gas. Appreciable fluid in the chest never developed. About the end of April, 1915, there were signs that the disease in the right lung had re-awakened and was extending. For two years prior to this time the patient had been leading an extraordinarily active life for one in her physical condition. From this time on the disease in the right lung progressed and her condition gradually became worse. No nitrogen was given between April 24, 1915, and October 30, 1915. On the latter date, owing to an uncomfortable feeling on the left side, 250 c.c. of nitrogen was injected in the still free pleural cavity. This was the eighty-seventh and last injection. It brought no relief. The patient steadily declined and died from asthenia on January 24, 1916.

Autopsy: Both thoracic cavities are dry. The left (collapsed) lung lies in the superior, dorsal, median part of the thoracic cavity, tightly compressed against the mediastinum and the vertebral gutter. It measures 13 x 4 x 5 cm. It is remarkably firm and overgrown with thick adhesions. In places the parietal pleura has been converted into dense, cartilaginous tissue, as much as 6 mm. thick. Section shows a large cavity, occupying the upper one-third of the lung, through which the remains of the bronchial tree are seen traversing the cavity. The lower two-thirds of the lung shows a remarkable condition of fibrosis mixed with caseating tubercle, interspersed between the bronchi and blood vessels, which appear very numerous because they have been brought into small compass. The fibrosis seems to be due for the most part to the long continued atalectasis. Dense, pearly gray, translucent lines traverse the section between the jumble of vessels and bronchi. In places these lines form a veritable network, although they are most pronounced running in a cranio-caudal direction. There is no doubt that any re-expansion of the lung would be impossible.

Discussion and Summary: In four of the above cases rupture of the lung occurred after artificial pneumothorax. In one, Case IV, the rupture was due to gangrene and took place after the third nitrogen injection. Of the other three cases, rupture with fatal hemorrhage ensued after a first injection (Case III), while in the other two the pleural tear developed only after repeated and long-continued (eleven to fourteen months) injections. In these three cases, I, II and III, anatomic conditions were singularly similar. In all three there were cavities that reached the pleural surface; there was a greatly thinned out pleura overlying the cavity; and in the immediate neighborhood there were strong adhesions that bound the particular area to the chest wall. The evidence is almost compelling that under these conditions rupture is likely to occur if the proper strain is brought to bear on the weakened pleura. It is very likely that the compression brought about by the altered intrathoracic pressure, which pushes the lung back and splints it, pulls the adhesions taut and at the same time stretches tightly the thinned out

pleura that lies between the adhesions and over the cavities. Any sudden increase in pressure whether from within (coughing, etc.) or from without (a too sudden increase when injecting the gas) may cause the pleura to break, and spontaneous pneumothorax result.

Cases I and V would seem to show that after much atalectatic induration due to long continued, complete collapse (a year or more), thorough re-expansion of the lung is an impossibility. At least, the anatomic picture gave this impression. In Case II, in which the lung had been compressed for eleven months, fibrosis was not a marked feature and it appeared that re-expansion was still a possibility.

FATAL HEMORRHAGE IN BONE TUBERCULOSIS, CASE REPORT AND AUTOPSY

By Robert C. Paterson, M.D.

Saranac Lake

While hemorrhage is a frequent and not rarely a fatal complication of pulmonary tuberculosis, it is extremely infrequent, if not unknown, in tuberculosis of the locomotor system. This may be explained by the great vascularity of the lungs as compared with the bones and also by the more benign course which osseous tuberculosis usually follows. Hemorrhage in any form of tuberculosis is caused by a spread of the tuberculous process through the wall of a patent blood vessel. In the tissue surrounding a growing tubercle, there is usually a zone of collateral inflammation of greater or less extent and in this zone the circulation of the blood vessels is frequently shut off by a thickening of the walls due to an endarteritis, a periarteritis or by thrombosis. Thus, in the majority of cases, by the time the necrotic process has spread to the vessels in the tissue surrounding the original tubercle, these vessels are no longer patent or their walls are so thickened that the danger of hemorrhage is lessened. Were it not for this fact hemorrhage would occur in every case of tuberculosis. By considering the anatomy of the bones and their vascular supply, the reason for the infrequency of hemorrhage in the bone itself will be apparent. The arteries in the bones do not form arterial anastomoses. They are end arteries. There is therefore no danger of reflux hemorrhage. Again the bone is a resistant tissue and an inflammatory exudate such as occurs in the zone of collateral inflammation, will close the vessels by pressure. Once the process has reached the stage of pus formation and the pus has broken through the periosteum and into the surrounding soft parts, where the large vessels are found, we have largely a mechanical problem to consider. The collection of tuberculous pus now burrows along the line of least resistance, separating muscles and extending under the fascia or along the sheaths of the neighboring vessels until it points beneath the skin, where it breaks through of itself forming a sinus or is opened by artificial means. The pressure and tendency to spread is in this way, not against the vessel walls and into the vessels, but rather parallel to them or towards the surface of the body. In the case here reported, the tuberculous process extended probably into the Internal Mammary vessels causing the fatal hemorrhage. The mechanical difficulties of obtaining drainage of the pus, the patient being forced to lie on his back owing to the multiplicity and sites of his lesions, kept a quantity of bacillus laden pus almost con-

tinually in the recesses of the various sinuses and as a result there occurred an extension in the walls and finally into the vessels with fatal result.

CASE REPORT

E.P. male, aet. 44 years.

Past History.— Whooping Cough as a child. Otherwise always healthy and accustomed to athletic exercise. Married 18 years. Has one child which is healthy.

Present Illness.— During the summer of 1913 there was noted a sensation of pressure beneath the sternum with some dyspnœa. This was accompanied by a fever of irregular type, occasionally reaching 102 degrees. In August an abscess was opened at the right sternal margin and this has continued to discharge ever since. In the autumn of the same year the glands in both axillæ became enlarged and were excised. At the same time a portion of the sternum and the second costal cartilage on the right side were removed. A little later the left wrist showed evidences of disease. The second metacarpal bone of the left hand was next involved and excised. In February, 1914, the left inguinal glands became diseased and broke down leaving several sinuses. The left epitrochlear gland and then the right epitrochlear became involved. Toward the end of the year 1914 the left knee became painful and enlarged and shortly after the left foot became diseased.

Condition, June 23rd, 1915:

Glandular System.— Scars of old sinuses or operations in the right supraclavicular fossa, both axillæ, over both epitrochlear glands. Enlarged glands in the right side of the neck and right groin. Several discharging sinuses in the left groin.

Osseous System.— Over the dorsum of the right hand there is a fluctuating swelling. The particular bone involved could not be determined. Right elbow shows limitation of movement, pain and tenderness and some swelling. Left hand: The second metacarpal bone has been removed, leaving sinuses both in front and behind which are still discharging. Sternum: A portion of the sternum at the junction of the manubrium and gladiolus on the right of the mid line has been removed. There is a sinus over this spot which discharges large amounts of thick pus. The second right costal cartilage has also been removed. The left knee is acutely painful, swollen, fluctuating and shows the classical symptoms of tuberculous disease. Left foot: There is a large fluctuating swelling over the dorsum of the foot. Over the inner surface of the head of the right tibia there is a small fluctuating swelling. Tubercle bacilli were repeatedly found in the pus from the various abscesses. The lungs are extensively involved. Treatment was directed chiefly to relieving the symptoms in the left knee and to dressing the various discharging sinuses. On July 31st there was some bleeding from the sinus in the sternum. This occurred again early the following morning and at 10 A. M. there was a pro-

fuse hemorrhage which was uncontrollable. Death occurred at 3 P. M. the same day.

Autopsy, 1st August, 1915:

Partial autopsy only allowed. Opposite the lower border of the junction of the second costal cartilage with the sternum, right side and 1 cm. to the right of the midsternal line, there is an opening, apparently that of a fistula, 1 cm. in diameter, through which clotted blood exudes. This is apparently the source of the fatal hemorrhage and is the only opening noted on the anterior chest wall. The sternum with the ribs attached was removed by cutting along the costo-chondral articulations on the left side, while on the right side the ribs were cut away at an average distance of from 15–18 cm. from the mid-sternal line, thus taking in apparently all the involved area so far as could be appreciated without further dissection. The heart and lungs were removed from the thorax together with this breast plate without cutting through the anterior mediastinum. The whole specimen was hardened in formalin and on the following day was carefully dissected. A linear piece of the sternum, measuring 14 x 1 to 2 cm., was chiseled out along the mid-line from the supra sternal notch to a point opposite the articulation of the 3rd rib. The fascia over the whole right side was carefully removed, part of the second rib was also removed. This latter was found to be necrotic. It was then seen that two separate areas of necrosis and suppuration involved the right side; these two areas were separated by the 3rd rib, and extended laterally to the side of the specimen. The most striking difference between these two areas is that the one above the 3rd rib shows a condition of much more destruction of bone, cartilage and soft parts. It is burrowing irregularly by channels running in every direction and all these channels are filled with clotted blood. Below the 3rd rib, however, the process is seen to be one mainly of suppuration, with pus confined between the superficial fascia and the underlying tissue in the intercostal spaces. Destruction of bone is not marked here although here and there the ribs show eroded edges. No hemorrhage is to be noted. This area extends to the 6th rib.

Area above the 3rd rib. Probes introduced into the external opening take various directions according as they slip into different sinuses which communicate with this opening. After dissection of the space is complete, it is noted that probes may be passed in a great many different directions if introduced into the sinuses that are present in the intercostal spaces and some pass into the medulla of the sternum. One probe passes behind the sternum to the left and upwards and comes out on the posterior surface of the breast plate just to the left of the midsternal line and into the left pleural cavity between the first and second ribs. It is doubtful whether there was a complete rupture originally through the pleura although the tissue is all but eaten through. Careful examination of the anterior aspect of this hemorrhagic abscess cavity fails to reveal the source of the hemorrhage. The examination of the posterior aspect

was then made. The right internal mammary artery was picked up and probed through the entire length of the specimen. Other small vessels as well as the large veins attached to the specimen were probed but no ruptured vessel wall was found. The vessels in most close relationship with the abscess cavity are the right internal mammary.

Area below the 3rd rib. The abscess here has an irregular confirmation and burrows between the anterior and posterior fasciæ by which it is confined, in places appearing in front and behind the ribs.

Examination of the remainder of the surface of the body merely confirms the clinical findings as regards location of the various lesions. The lungs are studded with miliary tubercles.

CELLULAR OR TISSUE IMMUNITY TO TUBERCULOSIS AND ITS RELATION TO THE PATHOLOGY OF TUBERCULOSIS

By Allen K. Krause, M.D.

Saranac Lake, N. Y.

Observations, as they have been made by a great number of investigators, on the phenomena of immunity to tuberculous infection in a great variety of animals, may be correlated as follows:

1. There is no immunity without a preexisting tuberculous focus.
2. This immunity begins to manifest itself with the development of the focus.
3. It decreases with the healing of the focus.
4. It disappears with the enucleation of the focus.
5. The degree of immunization varies directly with the virulence of the immunizing micro-organism: or, in other words, with the extent of tuberculous involvement of the tissues.

At the same time, the general principles underlying the various phases of cutaneous hypersensitiveness to tuberculo-protein, as laid down by various observers (Römer, Baldwin, Krause) may be summarized as follows:

1. There is no cutaneous hypersensitiveness without a focus (tubercle).
2. This hypersensitiveness appears coincidently with the establishment of the focus.
3. It diminishes with the healing of the focus.
4. It varies directly with the intensity of the disease which in turn is dependent on the virulence of the invading bacillus.

There have been investigations which show that the skin is not the only tissue in the body that reacts differently to tuberculo-protein or the tubercle bacillus once infection has occurred. Bail,[1] and Rist, Léon-Kindberg and Rolland [2] have shown that the peritoneum of animals suffering from tuberculosis will respond to re-infection altogether differently than to first infection with tubercle bacilli. Nichols [3] found the same thing to hold good for the lungs, and Rist and Rolland [4] for the kidneys. This difference, this changed reactivity or allergy was manifested by the capacity of the tissues to react in an inflammatory manner against re-infection. The reaction moreover was almost immediate or, at least, very early. When, however, an animal receives a first infection with tubercle bacilli then a tissue response of acute inflammation is never observed.

A comparison of the two tables as they are set down above and a consideration of the works of Bail, Rist and Rolland, and Nichols sug-

gested to the author the possibility that not only the skin but perhaps all the organs and tissues of the body took on a new function whenever tubercle, due to the invasion of the tubercle bacillus, obtained foothold in the animal organism. This new function is the ability of such tissues to *over-react*, to react to the implantation of the tubercle bacillus in a highly exaggerated manner, in such a way that tissue change occurs much earlier and to a greater degree than in response to a first inoculation with tubercle bacilli.

The presumption was strong that immunity to reinfection was a function of tissue hypersensitiveness. Furthermore, there was work at hand which suggested that in some way or other this immunity was bound up (perhaps only partially) with the inflammation by which allergy manifested itself. In his very enlightening Harvey Lecture on "Inflammation" Opie[5] had said, "Views concerning the nature of inflammation are widely diverse, but all are agreed that inflammation accomplishes the destruction and solution of a variety of substances, and notably of those proteins which form the bodies of parasitic invaders." In the same lecture Opie referred further to the work of Pawlowsky and of Issayeff. "Pawlowsky has demonstrated the presence of staphylococci in the blood and organs of guinea pigs from twenty-four to forty-eight hours after inoculation of the knee-joint, but has been able to show that this dissemination is inhibited or wholly prevented if before inoculation, acute inflammation of the joint has been produced by the injection of some sterile irritant such as turpentine, alcohol or solution of quinine." "Issayeff . . . showed that the peritonitis induced by a variety of sterile irritants such as a foreign blood serum, bouillon, or normal salt solution, temporarily increases resistance to subsequent intraperitoneal inoculation of bacteria."

Influenced by considerations, such as have been outlined above, the author in collaboration with his associates, Dr. W. B. Soper and Dr. R. C. Paterson, has for the last two years been engaged on studies of the relation of these changed tissue reactions, that occur when tubercle exists in the animal organism, to immunity. The work is far from complete but at present several facts seem to stand out prominently:

1. Once tubercle is established in an animal the tissues of this animal will always react differently to re-infection from without or to extension of tubercle from within (autogenous).

2. This allergy is manifested by accelerated reaction and (or) by over-reaction to stimulus — the irritation set up by the invading tubercle bacilli. We can show this by an experiment of the following nature. We can infect normal guinea pigs by a subcutaneous inoculation of tubercle bacilli of low virulence. Self-limited tuberculosis, confined to the regional glands, will then result. These animals will also show skin hypersensitiveness to re-inoculation. We now re-infect these animals intravenously with virulent bacilli and at the same time infect normal guinea pigs intravenously with the same doses of the same culture for the first time. The results will depend largely upon the dosage of the

virulent micro-organism. If the dose is large all the re-infected animals will very promptly become acutely ill and a number will die from twelve hours on, after re-infection. Autopsy will show œdema, hæmorrhagic areas and localized pneumonic patches in the lungs. On the other hand, the control animals, receiving a first intravenous infection, will not exhibit the slightest symptom of discomfort and all will survive the first few days. The re-infected animals that do not succumb to the intravenous inoculation will then greatly outlive the controls which very soon develop rapidly progressing tuberculosis and die.

If the dose is not too large, the re-infected animals will not die though they may become appreciably ill for the first few days following re-infection. If now, beginning at twelve to twenty-four hours after intravenous inoculation, we kill off the re-infected animals from day to day and compare them with the controls, we shall find some remarkable differences. The lesions, visible to the naked eye, appear in the lungs of the re-infected animals from about the third to fifth day. In the controls they are not to be seen until from the seventh to eleventh day. During the first two weeks to eighteen or twenty days the lesions are more numerous and more advanced in the immune animals than in the controls. From about the twentieth day on a change occurs. The tubercles in the controls "catch up" with those in the immune animals. They keep progressing and soon kill the controls. Those in the immunes clear up in large part, the disease becomes more and more localized and the animals live on, many for months and months.

3. That this changed tissue reactivity is not merely an *apparent* alteration of tissue function, that it is not produced by some humoral antibody (lysin?) in the immune animal that rapidly kills the re-infecting bacilli and thus allows large quantities of bacillary protein to be set free and exert their action on the tissues of the immune animal is proved by the following experiment:

Paterson prepared an emulsion of living, virulent H37 tubercle bacilli. He divided it into two equal portions. The one half he killed by subjecting it to 50° C. for four hours. The other half he kept alive for the same length of time in the ice chest. At the end of the four hours he inoculated two series of normal guinea pigs intravenously; the one series, with dead bacilli; the other, with similar doses of living bacilli. On killing the animals from day to day and sectioning them, he found that in those animals that had received living bacilli, tubercle developed much earlier and to a much greater extent than in those inoculated with dead bacilli.

4. Whenever diffuse or exudative reactions develop promptly in response to the inoculation of tubercle bacilli they are always in the immune animals and never in the controls (those receiving their first infection). The *first* reaction to tubercle bacilli in originally normal animals, the change occurring during the first few days is always focal tubercle. Pneumonic and hemorrhagic reaction takes place immediately only in the reinfected animal.

5. So far as we have gone, it is therefore suggested that the exudative types of reaction (tuberculosis) are expressions of response to immunity and that they occur probably only in the hypersensitive animal. And it is further suggested that the tremendous multiplicity of pathological change produced by the tubercle bacillus is determined not so much by anything inherent in the bacillus as by the variations of hypersensitiveness of the infected (re-infected) animal organism as well as the quantities of bacilli brought to bear at any given point. The portal of infection, whether hæmotogenous or lymphogenous, might also have its influence. But the fact remains that the allergic condition of the tissue must be of prime importance.

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DEMONSTRATION OF THE LUNGS OF RABBITS IMMUNIZED AGAINST TUBERCULOUS INFECTION

By Willard B. Soper, M.D.

Saranac Lake

In his paper just read Dr. Krause has outlined a conception of the cellular immunity to tuberculosis and its relation to the pathology of tuberculosis. He has told you the differences in cellular reaction to a second infection with tubercle bacilli as compared with the reaction to primary infection, a difference of reaction developed in both the guinea pig and the rabbit, and varying, in all probability, with dosage and virulence of the second infection as well as the degree of hypersensitiveness induced by the primary infection. Furthermore Dr. Krause has outlined the possible application of these facts to the explanation of the protean pathology of tuberculosis, every case of which as seen clinically may be regarded for all practical purposes as a second infection. During the past eighteen months we have been working upon various phases of this problem at the Saranac Laboratory. The rabbit lungs here demonstrated are a part of this work.

It is already a well known fact that the presence of the focus of infection in the experimental animal induces a relative immunity to further infection. Perhaps the best known work of Dr. Trudeau was his demonstration of this fundamental point in the case of rabbits. The rabbit lungs here demonstrated will serve to recall to your minds the striking degree of immunity to second infection attained when a primary focus is present in the animal body. In these animals the primary focus consisted of a tuberculous inguinal lymph node produced by subcutaneous injection of human type tubercle bacilli. The second infection was of virulent bovine bacilli injected intravenously. You will note certain striking features in these lungs as bearing not only upon immunity to secondary infection but also upon the cellular pathology of pulmonary tuberculosis. You will note the very much more rapid development of macroscopical tubercles in the lungs of the so-called immunized rabbits as compared with those of the control animals, which latter had no primary focus at the time of receiving the virulent intravenous injection of tubercle bacilli. You will note the strikingly greater degree of involvement in the so-called immunized animals killed during the period of sixteen to twenty-five days after virulent bovine infection, and you will note further how, from twenty-five days on, tubercles in the immunized lungs became increasingly fewer while those in the non-immunized control lungs progressed steadily to

almost complete consolidation of the lungs with the death of the animal.

Some of the problems are: as to whether the tubercles in the immunized lungs have become completely absorbed, and if so, what evidence of their previous existence remains behind; as to whether the type of cell in the tubercle of the immunized animal differs from that of the tubercle in the non-immunized animal; as to any comparable or contrasted occurrence of caseation in the two sets of lungs; as to the explanation of the relatively rapid disappearance of tubercle bacilli from the lungs of the immunized animal. On such questions as these we are not yet ready to report in full.

LEUCOCYTIC COUNTS IN RABBITS IMMUNIZED AGAINST TUBERCULOSIS. A PRELIMINARY REPORT *

By Robert C. Paterson, M.D., and E. N. Packard, Jr., M.D.
Saranac Lake

The question as to what rôle the leucocytes play in the reaction to infection with tubercle bacilli is still unsettled athough it has been the subject of much investigation and discussion, both clinically and experimentally. The special form of leucocyte to which the greatest importance has been attached is the lymphocyte, and the occurrence of the small round cells in and around the tubercle has led to the belief that they must play a part in the defensive mechanism of the organism against tuberculous infection. During the past year in the Saranac Laboratory, however, we have studied microscopically many sections of lungs from tuberculous guinea pigs, some of which had been previously immunized, and in many instances we have been struck with the small number of these small round cells around the tubercles, both in the non-immunized and in animals with known immunity to re-infection.

The literature on the subject of the blood picture in tuberculosis is very extensive and we will not attempt to review it as this has been done frequently in previous articles.

Recently the work of Murphy and Ellis [1] has renewed the interest in this subject. These investigators found that if albino-mice are inoculated with tubercle bacilli shortly after they have had their spleens removed, they show a lowered resistance to the infection as compared with non-splenectomized animals, while if the inoculation is made three weeks after splenectomy an increased resistance is found as evidenced by a longer average length of life than in control animals. These results confirmed the findings of Lewis and Margot.[2] The explanation offered by Murphy is that immediately following splenectomy there is a marked fall in the number of lymphocytes found in the blood. After eighteen days or three weeks the lymphocytes have increased to an even greater number than normal. The decrease in the lymphocytes thus accounts for the lowered resistance to the infection and the later increase in the lymphocytes accounts for the increased resistance. During the past summer and autumn we undertook some work with rabbits to test the value of the blood picture as an evidence of immunity to tuberculosis. We argued as follows: If it is true that the lymphocytes are an active agency in tuberculous immunity then it should follow —

* (From the Saranac Laboratory for the Study of Tuberculosis.)

1. That after a small inoculation, which tends to remain localized and heal, there should be an increase in the lymphocytes.

2. That after an inoculation of a virulent bacillus in an immunized animal, the immunity should be shown by a lymphocytic increase.

3. That the same virulent dose in a non-immunized animal, producing generalized progressive disease should cause a decrease in the lymphocytes.

In order to test this reasoning a number of rabbits were taken and the normal count, total and differential, determined. Some were then given subcutaneous inoculations with different strains of bacilli, and some kept as controls. Four weeks later all were given an intravenous inoculation with virulent bovine bacilli. Total and differential counts were frequently made until the animals died or were killed. Unfortunately an epizoötic of " snuffles " broke out among our rabbits and the majority of our animals showed signs of this disease, some dying and some being dropped from the experiment for this reason. Whether the blood picture of rabbits is influenced by this disease or not we are not prepared to state definitely, and we present our results with hesitation for this reason. In other experiments in this Laboratory we have not noticed that the course of a tuberculous infection in rabbits is altered by the intercurrence of snuffles, certainly not by the milder manifestations of this latter disease.

When we began making total counts on the rabbits before inoculation we were immediately struck with the very marked variations that we found. Thinking that our technique must be at fault we spent some days in perfecting this until the authors and a third worker could consistently obtain results within a 10 per cent. variation. Even then we found that the counts taken from day to day, at the same hour, and under the same conditions would vary greatly. We think that this may be due to the fact that the blood has to be taken from a comparatively large vein, where the leucocytes may be more unevenly distributed than in capillary blood. The repeated trauma necessary for the daily blood counts certainly alters the vessel walls, causing thickening and possibly leucocytic stasis. After some days the veins develop a beaded condition which must alter the free flow of the blood to a greater or less extent. For example we found if a drop of blood was taken and counted, and two hours later another drop taken from the same puncture hole, that the leucocytic count in the second drop was often over 20,000. Attempts were made to obtain capillary blood by skin punctures in various parts of the body, but without success. A marked variation in the normal leucocytic count of rabbits has been noted by Moss and Brown,[3] who urge caution in drawing conclusions from slight variations for this reason. Klieneberger[6] has also noted variation of 0-100 per cent. in the total leucocytic counts, which variations have no relation to feeding and occur in healthy animals. Lamson[4] has recently found that emotional disturbances, such as fright, will cause a polycythæmia in cats and dogs in a few minutes, the increase being as much as 100 per cent. in some cases. Possibly the

struggling of our animals, during or before the withdrawal of the blood, or some emotional cause may have influenced the leucocytic count in a similar manner. Whatever the reason, we must state that our total counts in normal rabbits have shown wide variations from day to day, 50 per cent. to 75 per cent. alteration being not uncommon in twenty-four hours, the blood being taken under as nearly as possible the same conditions each day, the normal count, taken in the morning before feeding, may vary from 7,000 or 8,000 to 15,000.

Experimental work:

Eight rabbits No. 1 to No. 8 were selected, and leucocytic counts made for several days to establish a normal.

No. 1, No. 2 and No. 4 developed snuffles, No. 5 was killed following accidental injury. These were replaced by four others, No. 9 to No. 12.

August 19th, 1915.

No. 3 and No. 6 received 1 cc. of a thick emulsion of tubercle bacilli, strain R1,* subcutaneously in the right groin.

No. 7 and No. 8 received 1 cc. of a thick emulsion of tubercle bacilli, strain H37,† in the right groin.

No. 9 and No. 11 received 0.5 cc. thick emulsion of bovine bacilli, strain B1,‡ subcutaneously in the right groin.

No. 10 and No. 12 were kept as controls.

The inoculations were made by a third worker so that the authors did not know which animals had been inoculated and which were controls.

In about six hours after inoculation, there is a distinct rise in the amphophiles,¶ the percentage reaching sixty or higher, and a corresponding fall in the lymphocytes, so that the normal picture is reversed. This is most strikingly seen in No. 8 which received 1 cc. H37 at noon August 19th, and whose amphophiles at 5 P. M. had risen to 65 per cent. and lymphocytes had dropped to 21 per cent. At this time there is no marked rise in the total count. In twenty-four hours the percentage of lymphocytes and amphophiles has usually returned to normal, but the total count has risen so definitely that the rise is unmistakable in most cases. This rise has disappeared in forty-eight hours. From now on until the second inoculation, thirty-two days later, the total count is somewhat higher on the whole than before inoculation and tends to be more irregular than it was.

Rabbits No. 3, No. 10 and No. 11 showed signs of snuffles and were

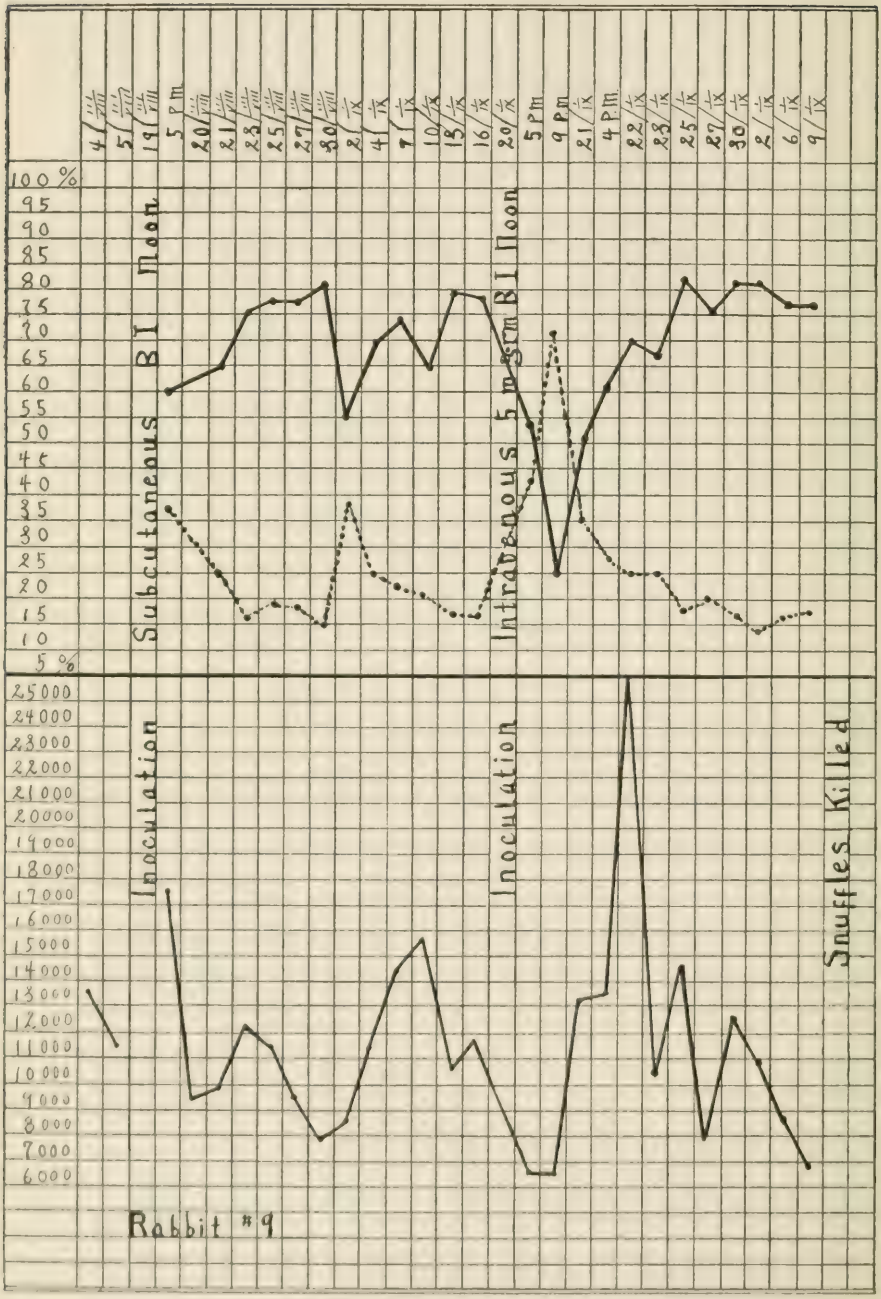
* Strain R 1 is a human bacillus which has become avirulent under cultivation, at present only causing local disease in guinea pigs.

† Strain H 37 is a virulent human organism.

‡ Strain Bl is a virulent bovine organism.

¶ Amphophile is the term used to designate the polymorphonuclear leucocyte, which in rabbits is filled with pseudo-cosmophilic granules. The normal differential count in rabbits was found to be—

Mononuclears large small and transitional	.55—70%
Amphophiles	.25—40%
Basophiles	.2— 8%
Eosinophiles	.05— 3%


Subcutaneous BI Noon
Intravenous 5 m gm BI Noon
Inoculation
Inoculation
Snuffles Killed
Rabbit #9
100 %
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5 %
25000
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
14000
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12000
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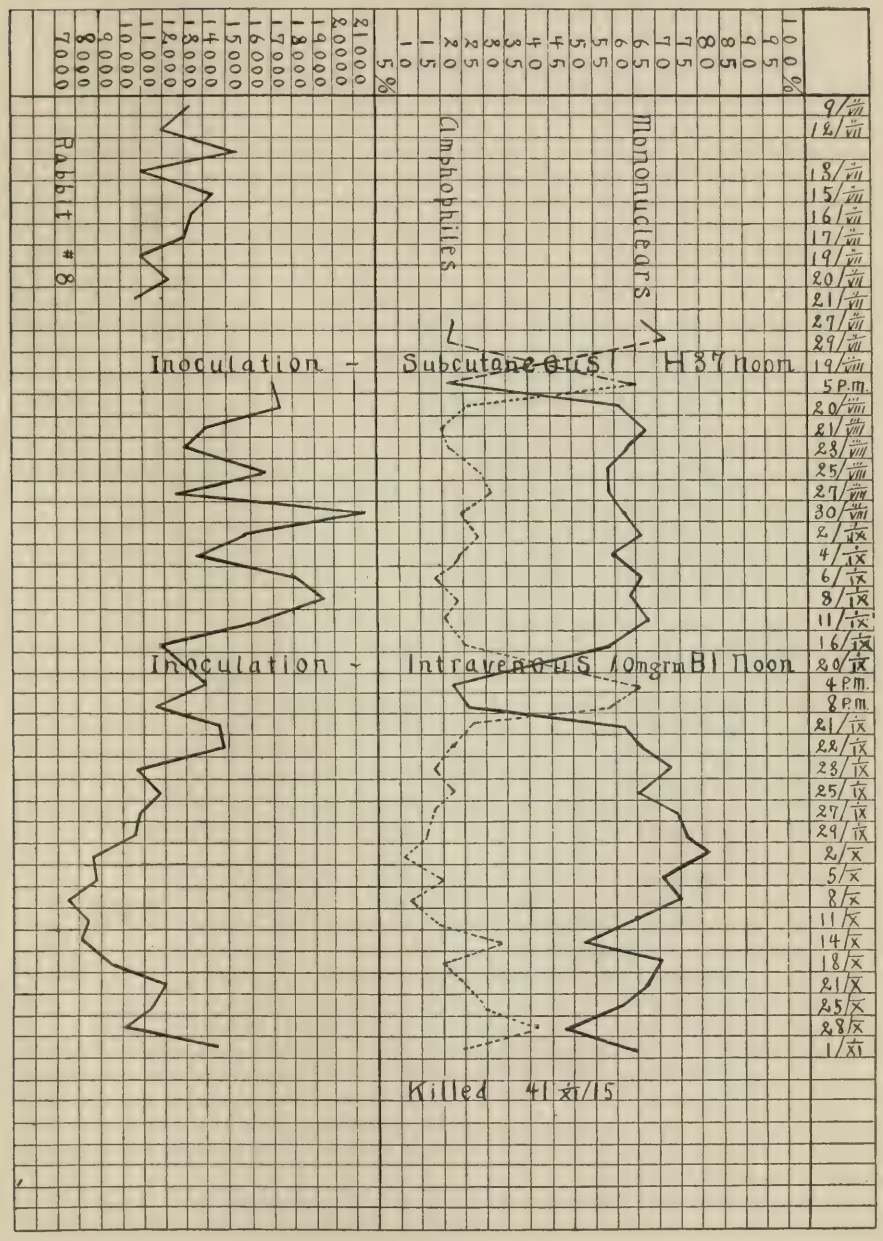
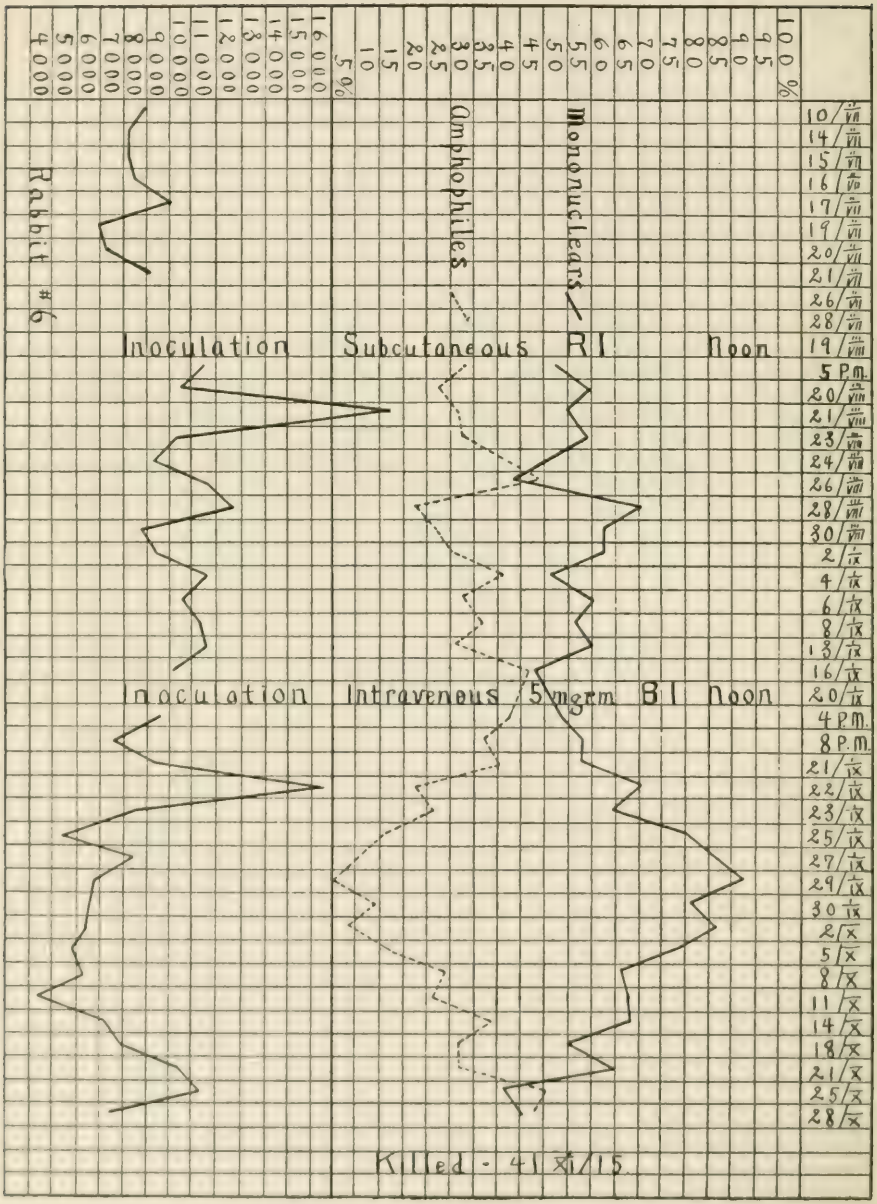
9000
8000
7000
6000


Rabbit #8
Inoculation +
Inoculation +
Subcutaneous 1 H37 Noon
Intravenous 10mgrm BI Noon
Killed 41 xi/15
Monocleears
Amphophiles


Rabbit #6
Inoculation
Subcutaneous
RI
Noon
Inoculation
Intravenous
5 mgrm
BI
Noon
Killed - 41 ½/15
Mononuclears
Amphophiles
100 %
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5 %
16 000
15 000
14 000
13 000
12 000
11 000
10 000
9 000
8 000
7 000
6 000
5 000
4 000
10/VII
14/VII
15/VII
16/VII
17/VII
19/VII
20/VII
21/VII
26/VII
28/VII
19/VIII
5 P.M.
20/VIII
21/VIII
23/VIII
24/VIII
26/VIII
28/VIII
30/VIII
2/IX
4/IX
6/IX
8/IX
13/IX
16/IX
20/IX
4 P.M.
8 P.M.
21/IX
22/IX
23/IX
25/IX
27/IX
29/IX
30/IX
2/X
5/X
8/X
11/X
14/X
18/X
21/X
25/X
28/X

discarded. Two others No. 13 and No. 14 were used to replace them but only received the intravenous inoculation without any immunizing subcutaneous inoculation.

September 20th, 1915, thirty-two days after the immunizing inoculation had been given, the following intravenous inoculations of a bovine emulsion were given. 1 cc. of this emulsion represented 5 mgrms. of bovine bacilli, dried between filter papers.

No. 6, No. 7, No. 9, No. 13 received 1 cc. emulsion = 5 mgrms. of bacilli into the ear vein.

No. 8 and No. 14 received 0.2 cc. emulsion = 1 mgrm. into the ear vein.

No. 12 received no inoculation and was used as a control.

The same change in the differential picture as was seen after the immunizing dose followed this inoculation, that is, a rise in the amphophiles and a fall in the lymphocytes with the same rapid return to normal percentages in about twenty-four hours. This is seen most strikingly in No. 8 and No. 9. The total counts also show a marked rise in twenty-four hours with a rapid fall, note No. 6 and No. 9. In from ten to fifteen days following inoculation the charts of No. 6 and No. 8 show an increase in the percentage of lymphocytes and a corresponding fall in the amphophiles. From this time on until these animals, the only two which showed no evidence of snuffles, were killed six weeks after the second inoculation, the lymphocytes gradually decreased and the amphophiles increased until the former were less and the latter more than normal. Another fact worthy of note is that the total count seems to fall gradually but steadily, reaching its lowest point in about three weeks after the inoculation. The results of other experiments in the reaction to re-infection with tubercle bacilli, carried out in this laboratory during the past year, have shown us that the tissue changes have become well marked in about two weeks: This is approximately the time at which we found the greatest percentage of lymphocytes, while with the development of an immunity to the infection we find the percentage of lymphocytes falling and that of the amphophiles increasing.

No. 6 and No. 8. Autopsy on these two rabbits, six weeks after the intravenous inoculation, showed enlarged caseous glands in the right groin, numerous tubercles in the lungs, which are apparently discrete.

Microscopically the tubercles are found to be composed almost entirely of epithelioid cells. No necrosis was found.

SUMMARY

1. Total leucocytic counts in rabbits vary so greatly from day to day in the same animal that marked changes are necessary if one is to draw any conclusions.

2. Our differential leucocytic counts have shown a somewhat higher percentage of lymphocytes than other observers have recorded. We find

the mononuclears to be from 55 per cent. to 70 per cent.; Brinkerhoff and Tyzzer [5] 45-50 per cent.; Klieneberger and Carl [6] 45 per cent.

3. Within a few hours after inoculation, whether immunizing or virulent re-infection, there is a definite rise in the amphophile percentage with a corresponding fall in the percentage of lymphocytes which disappears in about twenty-four hours.

4. Twenty-four to forty-eight hours after an inoculation there is usually seen a sharp transient rise in the total count.

5. At about the end of the second week after the virulent inoculation in immunized animals, there is apparently an increase in the lymphocytes, this period corresponding to that of the well marked tissue reaction.

6. As far as this work goes, we are unable to draw any definite conclusions as to the importance of the lymphocytes in immunity to tuberculosis in rabbits.

Although this work has been unsatisfactory up to the present, owing to the intercurrent disease in the animals, and is not yet completed, we have presented this preliminary report in order to record this method of attacking the problem. The work has been made possible through the generosity of Mrs. A. A. Anderson.

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SOME DERIVATIVES OF METHYLENE BLUE IN TUBERCULOSIS CHEMO-THERAPY *

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During the last few years, vital stains or at least dyes which can be introduced into the living animal body without material injury have interested therapeutists in several fields. Ehrlich [1] began his famous series of experiments on the chemotherapy of spirochete infections with the dye trypan red, which showed itself distinctly trypanocidal in certain mouse infections, and even salvarsan, according to Schumacher's [2] statement is a true dye. Wassermann [3] used eosin as a carrier for selenium in his experiments on cancer therapy. Lewis [4] has for several years been working with compounds of trypan red and trypan blue in the treatment of experimental tuberculosis and Weil [5] has recently published a communication on the use of certain dyes and dye compounds, notably congo-red, in the study and treatment of rat tumors. Corper [6] reported negative results from the treatment of tuberculous guinea-pigs with fat-soluble dyes and I have been working for a number of years with numerous dyes to determine whether they have any effect on experimental tuberculosis.

Of all the dyes used in chemotherapy, however, methylene blue is the classical example. It was one of the first dyes used as a vital stain and its specific action as a vital stain for the nervous tissues was discovered by Ehrlich [7] in 1886. As a result of this discovery, he [8] introduced it into chemotherapy in 1891 as an analgesic and it was used in neuralgias, nervous headaches, muscular rheumatism, epilepsy, migraine, pleuritic pains of tuberculosis, etc. In 1891 also Ehrlich and Guttmann [8] found methylene blue effective in the treatment of certain cases of malaria, being at least equal to quinine in cases of the quartan type, but much less effective in other types. In the same year, Einhorn [9] found that the urine of patients treated with methylene blue was sterile and remained so for three weeks; he therefore began using the dye in the treatment of cystitis and pyelitis. He also used it in the treatment of several cases of pulmonary tuberculosis with two definite ideas in mind: (1) that its analgesic powers might lessen cough and pain; (2) that its bactericidal influence might reduce the number of organisms in the sputum, since he found that the dye was excreted through the sputum. He, however, had little to say regarding the therapeutic results of his experiments.

* From the Otho S. A. Sprague Memorial Institute and Department of Pathology, University of Chicago.

He also used the dye in two cases of inoperable carcinoma with apparently good results. In 1912 and during the years since then, v. Linden [10] has published numerous communications on the inhibitory action of methylene blue on the growth of the tubercle bacillus in vitro and on its effectiveness in the treatment of experimental tuberculosis.

In some of my earlier work,[11] I showed that methylene blue and some of its derivatives have certain characteristics which recommend them for further investigation. These dyes were found to penetrate the tubercle, especially the younger epithelioid tubercle, in the body of the animal; they also penetrate the tubercle bacillus easily, as is shown by a clear stain of the individual organisms. In concentration of one part of methylene blue in five thousand parts of artificial media, the growth of tubercle bacilli is completely inhibited, while exposure of these organisms for twenty-four hours to one per cent. solution of the dye so diminished the virulence of the bacilli that in two out of nine guinea-pigs inoculated with cultures so exposed no disease developed, while in the others the local tubercle was very late in appearing and the general disease developed slowly and not at all extensively. The dyes used in this earlier work were methylene blue chloride and iodide, seven of the so-called "new methylene blues, the formulæ for two of which are given in Table A and two new dyes selenium blue and tellurium blue made for me synthetically in our laboratories, in one of which selenium, and in the other tellurium was substituted for the sulphur in the methylene blue molecule. While all these dyes resembled methylene blue in their penetrating and staining action, none were as efficient except perhaps new methylene blue N and new methylene blue GG, experiments with which are still being carried on. All of these dyes were tested for therapeutic value in experimental tuberculosis in guinea-pigs. None cured the disease, although most of them had some effect in lessening the extent of spread of the disease. Most of them, however, were more or less injurious so that treated animals did not live as long as the controls.

More recently methylene green, methylene green iodide, amido methylene blue bromide and iodide, iod-methylene blue iodide, mercuric chloride methylene green, mercuric chloride methylene blue and mercuric chloride iodmethylene blue have been made for me and have been tested as to therapeutic power and part of them as to bactericidal and inhibitory influence. Iod methylene blue, like methylene blue completely inhibits the growth of tubercle bacilli in vitro in a dilution of one part in five thousand. Mercuric chloride methylene blue requires three parts in five thousand to inhibit completely, this corresponding with the minimum inhibiting concentration of mercuric chloride, but being three times that of methylene blue. The structural formulæ of these dyes and their relation to methylene blue are shown in Table A.

With the exception of methylene green, these derivatives are more toxic than methylene blue so that I used at first a dose of one milligram, increasing gradually to three or four milligrams. They are also soluble with difficulty and the dye has been administered mainly by mouth in the

form of pills. This, however, has in most cases been supplemented by subcutaneous, intramuscular and intracardiac injections, as these were feasible. Table B gives in brief a summary of the results of the thera-

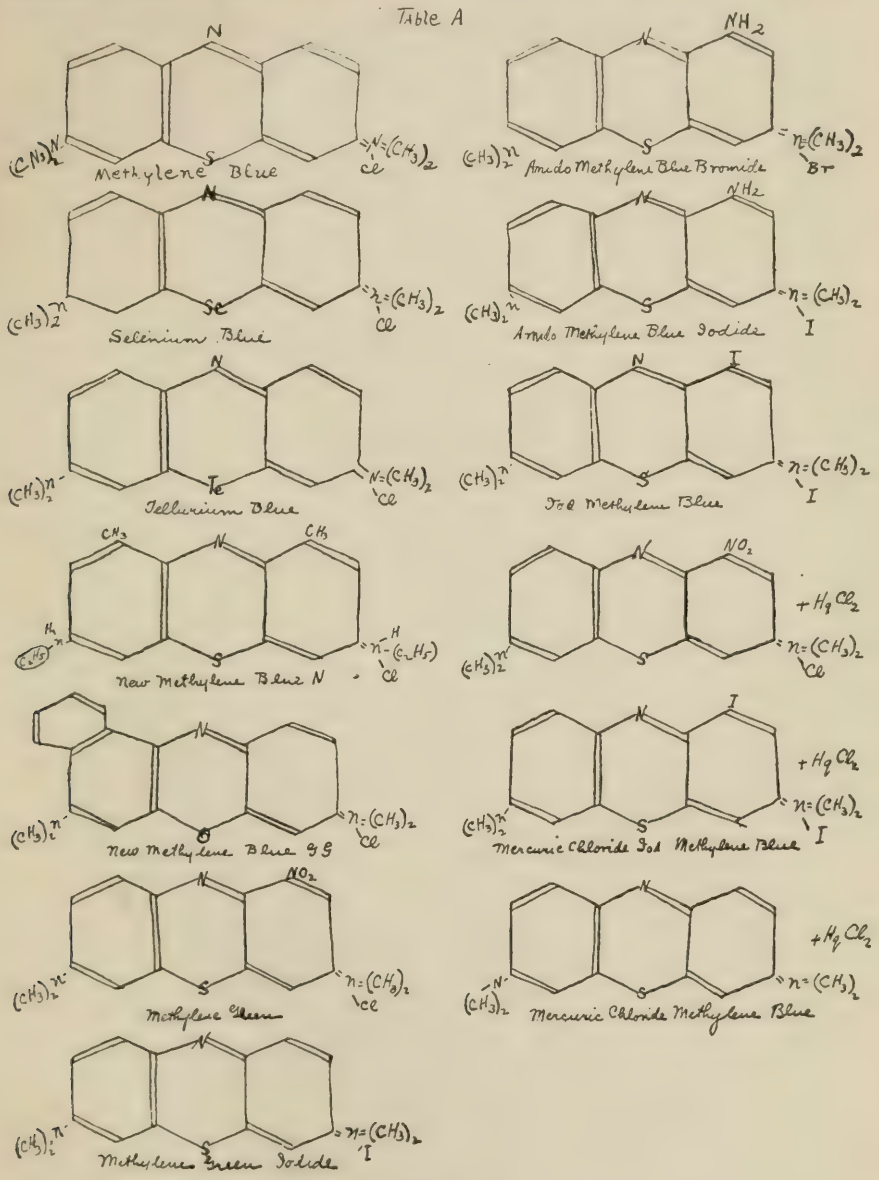

TABLE A

peutic experiments with these dyes. In this table, the average extent of the disease in the different organs and in general is expressed, for purposes of comparison, in numbers, on the basis of the condition in the con-

TABLE B.

	Controls	Methylene Blue Chloride	Methylene Blue Iodide	New Methylene Blue N	New Methylene Blue GG	Selenium Blue	Tellurium Blue	Methylene Green	Methylene Green Iodide	Amido Methylene Blue Bromide	Amido Methylene Blue Iodide	Iod-Methylene Blue Iodide	H_9CL_2 Methylene Green	H_9CL_2 Iod-Methylene Blue	H_9CL_2 Methylene Blue
Inhibitory action	.....	0.02%	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.02%	.....	.....	0.06%
Bactericidal action	.....	50	0	20	50	0	0	0	.....	0	.....	.....	.....	.....	.....
Dosage in milligrams	.....	0.9	0.6	1.0	1.0	3.0	1.5	1.0	2–10	1.0	2–4	1–4	1–3	1–4	1–2
Total amount in milligrams	.....	37.	21.	43	45	251	146	4	313	4	584	1–5 493 140	415	184	326
Duration of life in days — Treated	.....	136	111	117	140	88.6	95	117	152	65	167	227 134	222	209	204
Duration of life in days — Controls	.....	127	117.4	118	118	117.4	117.4	123	173	123	177	195 103	188	195	177
Lymph glands	.....	100	64	20	20	44	77	90	96	75	76	17 93	63	50	31
Liver	.....	100	78	20	45	71	90	80	94	85	86	27 27	70	58	12
Spleen	.....	100	90	50	40	90	85	98	60	85	96	43 87	71	62	30
Lungs	.....	100	56	50	45	95	100	85	88	95	83	58 27	70	42	20
Average extent of disease	.....	100	72	35	43	75	8.8	88	84	85	85	47	68	53	23

trols which is called 100. The report is preliminary, inasmuch as the experiments are still being carried on, but the table gives the results in the animals which have died up to the present time.

It may be seen from this table that none of these derivatives of methylene blue have cured the tuberculous infection in any of the animals. Many of the animals died from some intercurrent infection and in practically all, the disease was much less extensive than in the untreated controls of the same series. The animals treated with iod methylene blue lived considerably longer than the controls and indeed one is still living about sixteen months after inoculation. Animals treated with the three mercuric chloride salts of these dyes also lived considerably longer than the controls and the distribution of the tuberculous lesions was less than in the controls. The guinea pigs treated with the mercuric chloride salt of methylene blue were especially noted for the slight extent of the general tuberculous involvement, only one animal out of twelve showing sufficient involvement to account for his death.

While these results are in no sense conclusive they still seem to me of sufficient interest and importance to report here; they also encourage me to continue in this line of experimentation and to hope that in this direction may lie the answer to the question on which so many of us are working — the chemotherapy of tuberculosis.

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INFLUENZA BACILLI IN THE SPUTUM OF CONSUMPTIVES

By Mary L. Hamblet, M.D., and H. L. Barnes, M.D.
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It has been our object to obtain data as to the frequency of influenza infection as a complication of tuberculosis, as to the frequency with which the symptoms of patients diagnosed as having tuberculosis but with negative sputum may be accounted for by chronic influenza infection and as to what extent the percentage of recoveries in sanatoria for tuberculosis have been swelled by the inclusion of cases of influenzal bronchitis.

Influenza bacilli are said to be present in a large percentage of the population.[1] Lockhart's [2] summary of the results of Scheller, Holt, Lord, Davis, Allen, Boggs, Grassberger and Wollstein shows that in 172 supposedly normal individuals, organisms of the influenza type were found in 25 per cent., while in 427 cases of infection they were found in 50 per cent. Leutscher [3] found the influenza bacillus responsible for 22 per cent. of 388 cases of acute infection of the respiratory tract. Hastings and Niles [4] found influenza bacilli in only 1.5 per cent. of cases of infection of the respiratory tract. Webb [5] has reported 15 tuberculous patients who succumbed to epidemic infection with the influenza bacillus. Koch [6] stated that when influenza is prevalent "cases occur which, to the eye of the clinical observer, exactly resemble incipient tuberculosis, but are not that." Madison [7] reported 6 cases of chronic influenzal bronchitis which had much clinical similarity to tuberculosis.

Lord's [8] work is of special interest. In 1902, he found influenza bacilli present in the sputum of 60 out of 100 cases with cough, presenting themselves at the Massachusetts General Hospital, and with no evidence of tubercle bacilli in the sputum. In 1905,[9] Lord reported on 186 cases similarly studied. In 59 per cent. of these, "organisms having the morphology and staining reactions of influenza bacilli were seen in varying numbers. In 30 per cent. the organisms were shown by culture to conform in all respects to the cause of epidemic influenza." Four of Lord's cases had been admitted to consumptive homes.

The clinical material for this investigation consisted of 320 patients of the Rhode Island State Sanatorium. Two hundred and twenty consecutive cases having negative sputum were examined in the years 1912 to 1915, and one hundred cases with positive sputum were examined in the winter and spring of 1916.

The diagnosis of pulmonary tuberculosis in 200 cases having negative sputum was made on the history, symptoms and physical signs. There

was a family history of tuberculosis in 36 per cent., a history of pleuritic pain in 55 per cent., of hemoptysis in 45 per cent., of fever in 51 per cent., of night sweats in 46 per cent. and tubercle bacilli were found subsequently in 15 per cent. In 32 cases it was thought advisable to test with tuberculin subcutaneously and the result was positive in all. Twenty patients whose sputum was negative for tubercle bacilli and influenza bacilli, cultures having been made for the latter in 13 cases, were excluded from the above series because the diagnosis of tuberculosis was considered doubtful.

In 50 cases of the first series the cultures were made by Dr. Mary E. Gaffney, all the remaining cultures were made by Dr. Hamblet.

The technique was as follows. The patients were required to deposit, in bottles which had been boiled, only morning sputum actually raised. In the first hundred cases, the technique of Lord was used, with slight variations in the method of washing the particles of sputum selected for inoculation. In the first 43 cases, sterile bouillon or normal salt solution was employed, two washings being made. In the succeeding 57 cases, Armstrong's [10] method of washing the sputum in tap water was followed. The culture medium in all three series was agar, the surface of which had been smeared with a few drops of human blood under aseptic precautions. Of the cultures made from the first 100 cases, 93 failed to show any influenza-like organisms. Of the 7 suspicious cases, 3 were proven negative to influenza by subcultures, 3 remained doubtful and in only one was the influenza bacillus positively identified.

In the second series of 100 cases, cultures were made only in those cases in which the stained smears from the sputum showed Gram-negative rods having some similarity to the influenza bacillus. The technique of Park and Williams [11] was followed in this series, the chief point of difference being that the sputum was not washed before inoculating blood agar plates. In accordance with a recommendation from the New York City Department of Health laboratories, we used in this series agar having a reaction neutral to phenolphthalein. In the other two series, the reaction of the agar was acid to phenolphthalein (+ 1). Cultures were made in 20 cases of the second series, and in 6 of these microorganisms having the characteristics of the influenza bacillus were found to be present.

In the third series, for purposes of comparison, a study was made of the sputum in 100 cases which had previously shown tubercle bacilli in the sputum. Sputum for this series was collected in paper sputum cups. Smears stained by the Gram-Weigert method were examined and cultures made by the method of Park and Williams in all suspicious cases. The smears from 23 cases showed bacilli having some resemblance to the influenza bacillus. In 7 of these the microorganisms were proved to have the characteristics of the influenza bacillus.

Of the 14 patients whose sputum contained influenza bacilli, there had been a clinical history of influenza in but 3.

The cases in the first two series were examined uniformly at all seasons of the year. Six of the 7 sputums from which influenza were recovered were examined during the winter and spring months.

From the 2nd and 3rd series of the writer's work it appears that bacilli having the morphological and cultural characteristics of influenza bacilli were recovered from the sputum of about 6 per cent. of our sanatorium patients having negative sputum and from about 7 per cent. of patients having positive sputum. As these bacilli were never in pure culture or even predominating over other organisms it does not seem probable that they constituted a serious complication in those having positive sputum or that they were the real cause of lung disease in those having negative sputum. It is perhaps not impossible that a true influenza infection of the lung may have originally been present in some of these cases and that the infection may have so improved that the influenza bacilli ceased to predominate before the patients were admitted to the sanatorium. If it should be granted, however, that all patients in the above series whose sputum was positive for influenza and negative for tubercle bacilli had influenzal bronchitis and were free from active tuberculosis, this would amount to but 6 per cent. of cases having negative sputum and only about 2 per cent. of all patients discharged from the sanatorium. This percentage would be too small to sensibly affect the accuracy of our sanatorium statistics.

SUMMARY

1. Of 100 patients in series 1, diagnosed as having closed tuberculosis whose sputum was cultured for influenza, at least 96 were negative.

2. Of 100 patients in series 2, diagnosed as having closed tuberculosis, influenza bacilli were recovered from 6.

3. Of 100 patients in series 3, with open tuberculosis, influenza bacilli were recovered from 7.

4. Of 20 patients in whom the diagnosis of tuberculosis continued doubtful, the sputum was negative for influenza bacilli in all.

5. In none of the patients examined did the influenza bacilli occur in pure culture nor were they the predominating organism.

CONCLUSION

A study of 320 sanatorium patients, extending over 4 years, furnished no evidence that influenzal bronchitis frequently simulates or complicates pulmonary tuberculosis.

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STREPTOTHRICOSIS OF THE LUNGS WITH REPORT OF CASES

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In December, 1914, a patient (Case I.) was admitted to the Connecticut State Sanatorium, Shelton, for treatment for Pulmonary Tuberculosis in apparently a moderately advanced stage of the disease; dyspnœa was much more marked than would be expected and within a few days became so severe he was removed to the infirmary. His was one of the most distressing cases I have ever seen; for about two weeks he was unable to lie down, but he did not assume the characteristic attitude of the asthmatic. For several days it did not seem possible he could live, hypodermatic injections were necessary; morphine and nitroglycerine gave the most relief, but only for a very short time.

On admission his sputum was negative for tubercle bacilli and they were not found on repeated examinations. During this violent attack, while examining a smear from his sputum stained by Gram's method, I discovered a tangled mass of branching hair-like organisms which were Gram positive and answered the description of the streptothrix; later the granules were found in the sputum in large numbers.

The streptothrix in this case was discovered February 1, 1915, and since then the sputum of all patients negative for tubercle bacilli are repeatedly examined in twenty-four hour amounts for granules, and smears are stained both by Gram's and Gabbett's methods. I wish to report today the following twelve (12) cases of Streptothricosis, the organisms having been grown in each instance, from five (5) cases in pure culture.

Case I. L. P. Male. Colored, aged 51 years; married; janitor in theater, sweeping floors, tending furnace, etc; had great many "colds." The first week in April, 1914, he was taken ill with cough, shortness of breath and pain in right chest; ill in bed for two weeks. In December, 1914, symptoms returned and he expectorated blood. He was admitted to Shelton Sanatorium, December 21st, 1914, with involvement of the upper and middle lobes of the right lung; had marked dyspnœa; general condition good; temperature 98-99.2; pulse 80-100; sputum, negative. The dyspnœa increased and January 26th he was removed to the infirmary; temperature 99-101; pulse 100-140; sputum still negative; general condition bad. On February 1st streptothrix discovered in sputum and Potassium Iodid treatment started. Medical note March 23rd — "Right lung clearing up. Shortness of breath in early morning; general condition fair; treatment K.I. Saturated Solution up to 4 cc. daily; streptothrix present; temperature 99-100; pulse 80-112; weight 122

pounds, gained two (2) pounds." April 20th —" Feels fine. Has gained ten (10) pounds in weight; no râles or cough; slight expectoration and an occasional granule found; temperature 98-99; pulse 80-96." During May and June improvement continued. Upon his leaving the sanatorium, July 1st to go to work, he had no dyspnœa or cough. There was slight expectoration which still contained an occasional granule; breathing was rough in both upper lobes, but no râles; temperature 98-99; pulse 80-96; he had gained 11½ pounds.

On May 25th two or three acid fast organisms were discovered in a sputum smear. Guinea pig (410.5 gms.) inoculated with sputum from this case was killed and autopsied November 24th, 1915. Weight 530 gms., and normal to all macroscopic appearance.

Case II. J. L. Male. Aged 43 years; married; stock-keeper in factory, which necessitated his spending much time in dark cellars. In spring of 1910 had a hemorrhage with severe dyspnœa; he has had constant medical attention since, mostly in sanatoria, supposedly for Pulmonary Tuberculosis, although the tubercle bacilli were never found. There was involvement of the whole right lung with apparently cavity formation in lower lobe. He has had extensive iodide treatment with little effect. For a time tuberculin (B.E.) was used but discontinued because of the production of large musical râles which were distressing to the patient. They subsided with the stopping of the tuberculin. Granules were found in large quantities; there were no clubs. Guinea pig inoculated with sputum from this patient was autopsied four (4) months later and showed no signs of tuberculosis.

Case III. E. R. Male. Aged 20 years; single; time-keeper in factory. In August, 1914, he developed chills, fever, chest pain, cough, dyspnœa and blood-streaked sputum; had night sweats occasionally; weight 102½ pounds, 14 pounds under weight; whole left lung involved with broncho vesicular breathing at right apex. This patient had been doing poorly and was continually in bed. The streptothrix was discovered on April 18th, 1915, and he was immediately started on iodide treatment; the improvement was marked. He left the institution July 18th, 1915, against advice; all symptoms had improved; he had gained five and one-half (5½) pounds, and a few râles could be discovered only after coughing. Acid fast organisms were constantly found in his sputum in fairly large numbers. Pure culture of the streptothrix was obtained but lost before any extensive study of it was made; the young culture, however, was not acid fast. The acid fast organisms found in the sputum were regarded as tubercle bacilli; the ends were somewhat bulbous and stained darker than the central portion and there was some branching. Guinea pig (426 gms.) inoculated June 16th, 1915, with sputum from this patient was chloroformed and autopsied November 24th, 1915. (Weight 510 gms.) There was no macroscopical evidence of disease.

Case IV. E. W. Female. Aged 20 years; factory hand; mother died a short time after a confinement, cause unknown, but patient says she had a cough. Patient developed a cough in October, 1914, and sputum

has been blood-streaked several times since. She had pain in the right side, with severe dyspnœa, and occasional night sweats. Once or twice in the early morning she expectorated a pinkish muco-purulent sputum; temperature normal; pulse 84-100; weight 98¾ pounds; greatest weight 105 pounds. The entire upper lobe of the right lung involved; "showers" of medium moist râles; sputum negative for tubercle bacilli; positive for streptothrix. Iodides were given in ascending doses. She was admitted to the Shelton Sanatorium November 7th, 1914, and left to go to work June 20th, 1915, with no sign of activity in the lungs; temperature and pulse normal. At present she is working in a store and enjoys perfect health.

Case V. Jos. L. Male. Aged 24 years; druggist; admitted August 27th, 1915. Six weeks previously had tonsils removed; this was followed a week after by what was diagnosed as pneumonia. The second week of the pneumonia patient had two hemorrhages of about 25 cc. each, and two weeks later another of 50 cc. On admission he had a slight cough and expectorated two ounces of yellowish-green sputum in twenty-four hours; there was sub-sternal pain and a well defined area of consolidation just below the left clavicle. He had lost twenty-three (23) pounds in six (6) weeks. Repeated sputum examinations before and after admission were negative for tubercle bacilli. September 15th streptothrix were discovered and he was given iodides to saturation; improvement was rapid and he left the sanatorium December 22nd, 1915, to go to work, having gained nineteen (19) pounds and with his lungs apparently clear. One granule found in the sputum from this patient presented well defined "clubs." It is interesting to note that this granule was the last one found and he had been on iodide treatment for several weeks. There appears to have been some connection between the tonsillotomy and the streptothricosis, and this would tend to substantiate Lord's theory [1] that the tonsils and carious teeth are harbingers for these fungi and that they may start up active disease elsewhere.

Case VI. S. D. Male. Aged 34 years; married; carpenter; father died of "asthma." Patient had pleurisy in 1910 and has had cough more or less since. In January, 1914, cough increased and he had marked dyspnœa with bloody sputum; he lost weight and strength rapidly and in March, 1914, weighed 106 pounds; ordinary weight 167 pounds. He began to improve the latter part of March and continued to improve until the latter part of August, when he weighed 144¾ pounds. During the next month he lost thirty (30) pounds, cough increased and he expectorated about eight (8) ounces of fœtid sputum in twenty-four hours. At this time he had involvement of the whole right lung and lower lobe of the left lung. He continued to lose and died May 8th, 1915. Sputum was never positive for tubercle bacilli, but loaded with streptothrix granules. No iodide treatment was given. No autopsy could be obtained.

Case VII. M. C. Male. Italian, aged 21 years; single; electrician. In September, 1914, he had a hemorrhage which was followed by pain in the right chest and marked dyspnœa. Cough worse at night and

morning; he expectorated four (4) ounces of muco-purulent sputum in twenty-four hours. The whole right lung was involved and lower lobe of left. Temperature ranged from 98–100; pulse 88–110; sputum negative for tubercle bacilli, but loaded with streptothrix. He was admitted to the Shelton Sanatorium, February 6th, 1915, and died March 13th, 1915. No iodide treatment was given. No autopsy was allowed.

Case VIII. P. M. Male. Aged 38 years; married, wife and five children well. He was always well until fall of 1913 when he developed pleurisy and empyema, supposedly tuberculous; ribs were resected in November. During March, 1914, the left knee began to swell, finally broke down and as a result, in September, 1914, the left leg was amputated; the stump healed well, but in January, 1915, an abscess developed over the right hip, and was opened. On examination both the sinus in chest and hip were discharging small quantities of this pus; he was dyspnœic and had involvement of the entire right lung; the cough was slight with two (2) to four (4) ounces of fœtid yellow sputum in twenty-four hours; temperature 97.2–99.2; pulse 80–100. Sputum and pus both negative for tubercle bacilli, but positive for streptothrix. He was started on iodide treatment which was discontinued because of gastric irritation. He says he feels better, but appears to be failing.

Case IX. E. R. Female. Aged 24 years; mentally deficient. She thinks her mother died of lung trouble. Patient was always well until August, 1912, when she developed cough, chest pain, dyspnœa and a few days later expectorated blood. She has a chronic fibroid condition in the upper lobes of both lungs. An acid fast organism was found once which was called a tubercle bacilli. At times the streptothrix has stained acid fast in sputum smears, but artificially grown is not acid fast. She has had extensive iodide treatment but shows no improvement. Guinea pig inoculation was negative.

Case X. J. P. Male. Austrian; aged 29 years; married; occupation, tool-maker. During the latter part of April, 1915, patient, while intoxicated from beer, was thoroughly drenched in a rain storm and "caught a cold." When admitted May 27th, 1915, he had marked dyspnœa, night sweats, appetite poor; weight 197¾ pounds, had lost twelve (12) pounds in five (5) weeks. Cough was very troublesome and had a metallic quality; he expectorated about four (4) ounces of fœtid yellow sputum in twenty-four hours. The entire right lung was involved but he did not appear sick. Sputum was negative for tubercle bacilli; positive for streptothrix. Iodide treatment given and the effect was very apparent. He left November 21st, 1915, to go to work. Cough, dyspnœa and expectoration had gone; had gained seven (7) pounds, temperature and pulse normal. Expiration was still harsh and prolonged, but there were no râles.

Case XI. S. H. Female. Aged 23 years; single; factory hand in wire mill; dusty. Two brothers, aged 28 years and three months, respectively, died from "fever and convulsions." Patient had pneumonia in 1902. February, 1915, pleurisy developed, followed by chills, fever, night

sweats, cough and dyspnœa. She expectorated about four (4) ounces of pinkish sputum a day. Appetite was good, but she lost twenty (20) pounds in two (2) months; weight on admission, 106 pounds; temperature, 98–100; pulse, 80–96. She did not appear sick but had involvement of whole left lung with broncho vesicular breathing over upper right lobe; sputum negative for tubercle bacilli; streptothrix, positive. Sputum was loaded with granules. She was admitted May 17th, 1915, and left to return to her home in Ireland, June 10th, 1915. No iodide treatment was given.

Case XII. A. M. Female. Aged 27 years; single; housekeeper. Father died, unknown cause; mother died, aged 56 years, of tuberculosis; four brothers and four sisters died of tuberculosis. In the spring of 1914 patient began to cough and have pains throughout chest; had night sweats and blood-streaked sputum in October, 1914, and March, 1915. Was dyspnœic at times, appetite poor and lost twenty (20) pounds. Weight on admission was 110½ pounds. There was involvement of entire upper lobe of right lung and cog-wheel breathing throughout rest of lung with lessening of vesicular murmur. General condition was good; temperature 97–99; pulse 90–96. Tubercle bacilli were never found and guinea pig inoculation was negative. For some time Gram positive rods only were found in the sputum, but with administration of iodides many granules were found. Patient left September 9th, 1915, to go to work; condition excellent, temperature and pulse normal; no cough or expectortation; no râles and showed a gain of sixteen (16) pounds, eleven (11) of which were gained after the streptothrix was discovered and iodide treatment started.

The above twelve cases reported were of patients whose condition was diagnosed as tuberculosis, and were referred to the Shelton Sanatorium for treatment. Much has been written about streptothricosis, especially in periodicals, and cases are not at all rare and my only reasons for reporting these cases are, first, as a preliminary for some work I am doing which I expect to report later, and second, because they all presented symptoms which, while not at all distinctive, were nevertheless, constant and might suggest at least the possibility of a streptothrix infection, especially when there are clinical symptoms of tuberculosis and no acid fast organisms can be found in the sputum.

I. *Dyspnœa.* All of the twelve patients had dyspnœa, which in several instances was the cause of their seeking medical advice; in some it was exceedingly severe and in all cases was greater than in any cases of tuberculosis that I have seen of corresponding duration and involvement. This dyspnœa, as pointed out by Claypole,[2] is probably due to the great amount of fibrous tissue produced.

II. *General Condition.* The good general condition was very noticeable. The color of the skin and facial expression was more like that of a person in good health than a tuberculous subject. None of them

"looked" sick; in fact the two patients (Cases VI & VII) who died, did not appear particularly bad until a short time before death occurred.

III. *Involvement.* Compared with the good general condition a striking point was the extensiveness of lung involvement and the great number of râles.

IV. *Hemorrhage.* All of the twelve patients had hemorrhage or blood-streaked sputum, and four (4) of these had continual pinkish malodorous sputum.

V. *Pain.* All had pain in the chest and the pleurisy was a rather constant early symptom.

VI. *Teeth.* The entire twelve had excellent teeth, in fact nine (9) of the twelve had perfect teeth. Cases I, II and VIII had a slight pyorrhœa and the teeth were not clean, but compared with the average tuberculous patient, the good sound teeth of these twelve patients were most interesting.

The treatment in all cases was iodide to saturation, potassium iodide usually being given until symptoms of iodism appeared when some other preparation of iodine was substituted, the treatment being continued for months, if possible. In those patients who responded to treatment there was a marked increase in the quantity of expectoration and also of the granules, and a corresponding rapid increase in weight. After a few weeks both the cough and expectoration decreased with a corresponding decrease in the number of râles. With the exception of the temporary increase in expectoration the above changes were lacking in the patients who did not do well, and there was a greater tendency to gastric irritation.

The administration of iodides in pulmonary tuberculosis has long been considered, by many, injurious and especially dangerous in hemorrhage cases. As all of these cases of streptothricosis had had hemorrhage or blood-streaked sputum, some of them quite recently, it was with some trepidation that I began the iodide treatment, but in no case was the treatment followed by hemorrhage or even blood-streaked sputum.

Results of treatment. Three (3) patients did not receive iodide treatment, Cases VI and VII who died, and Case XI who returned to Ireland. The results in the nine (9) who did receive treatment are as follows: one (1) failing (Case 8); two (2) unimproved (Cases 2 & 9); one (1) improved, but lungs show some activity (Case 3); five (5) improved, lungs showing no activity (Cases 1, 4, 5, 10 & 12).

The streptothrices may be divided roughly into the non-acid fast and acid fast varieties. The recognition of the non-acid fast streptothrices presents little difficulty, but the great similarity of the acid fast streptothrices and the tubercle bacilli is very confusing. Foulerton[3] says, "The non-acid fast forms usually produce localized disease. Nocard's streptothrix produces in the guinea pig an acute disease indistinguishable anatomically or histologically from a tuberculosis produced by Koch's bacillus." The importance of the disease to the worker in tuberculosis is apparent. The recognition of the disease is at times

very difficult. Claypole[4] reported upon a method of diagnosis using an extract of the streptothrix, analogous to Koch's old tuberculin, after the method of von Pirquet skin test. Through the kindness of Dr. Gay I procured a culture of streptothrix eppingeri from the late Dr. Claypole's collection and prepared an extract which was probably the same as the original one used by Claypole. (The streptothrix eppingeri is partially acid fast.) Unfinished experiments with this extract promise some interesting if not important results.

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DISCUSSION ON PAPER BY DR. STOCKWELL

Dr. H. J. Corper, Chicago: I would like to have Dr. Stockwell suggest some test which could be applied in every case for routine examination, so that it would be impossible to find the streptothrix. At the Municipal Tuberculosis Sanatorium of the City of Chicago we have not had a single case of streptothrix in two thousand cases thus far passing through our hands. This may be due to either inability to recognize the same, or as Dr. Lewis suggested, due to local absence of such infections.

Dr. E. D. Downing, Woodmen, Colo.: I feel quite envious of Dr. Stockwell's fourteen cases of streptothricosis. We found one case in a series of about five hundred tuberculous patients. Of course, the class of patients we handle are mostly early cases. It seems that the farther west one goes, the more fungus infections that occur. Our case conforms to the typical picture so well given by Dr. Stockwell, i.e. a person in apparently good health, but with profuse expectoration, extensive involvement and these typical granules in the sputum.

If one takes the trouble to spread out the sputum on a black glass plate of all the cases in which tubercle bacilli cannot be found, he will not miss the sputums containing these large granules. Apparently guinea pigs are immune to some strains of streptothrix. We were unable to infect them. Mr. Petroff's gentian violet media will cut off some of the contaminating organisms which prevented Dr. Stockwell from obtaining pure cultures.

STUDIES IN TUBERCULIN HYPERSENSITIVENESS AS DETERMINED BY INTRACUTANEOUS TESTS OF DIFFERENT DOSAGES

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Hypersensitiveness to tuberculin was studied in twenty-eight patients whose notes are sufficient to permit of analysis. Thirteen were male and fifteen female. Fifteen were ten years old or younger, four were between eleven and twenty years of age, five between twenty-one and thirty, and one in each of the next four decades. Nineteen were in the first stage of the disease, six in the second stage, and three in the third stage. Eighteen were in the first class of Turban, seven in the second class, and three in the third. Twenty-two were improving and six were stationary. The patients were on my service in the Eagleville Sanatorium for Consumptives, the Home for Consumptives, Chestnut Hill, the pediatric ward of the Jewish Hospital, and in my private practice.

The tuberculin was injected into the skin, as a rule three injections of different strengths being made at one time in the forearm in a diagonal line, so that no injection was directly below another. With a few exceptions that will be referred to later, the smallest injection was given distally and the largest proximally. Care was of course taken to insure accuracy of dosage.

Tuberculin Rückstand was injected in all but two of the patients, who were injected with old tuberculin. As a rule the first injections were one ten-millionth, one millionth and one one-hundred-thousandth of a milligram. If no reaction was observed the patient was next injected with one ten-thousandth, one thousandth, and one hundredth of a milligram. If these failed to show a reaction the patient was next injected with one tenth of a milligram, one milligram, and ten milligrams. The injected areas were examined at the end of twenty-four hours in every case, and again at the end of forty-eight hours in most of the cases and in a number of cases at other intervals up to thirty-six days. In a few cases the patient tested was examined at intervals of several hours.

CHART I. SHOWING THE CHARACTER OF THE REACTIONS AND THE NUMBER OF TIMES EACH OCCURRED.

Nature of the Reaction	No. of Cases	No. of Tests
Areola only	12	17
Induration only	4	5
Papule only	4	5
Areola and induration	14	34
Areola and papule	19	37
Induration and papule	2	3
Areola, induration and papule	17	48

The character of the response varied. An areola alone was noted in twelve patients and seventeen tests; induration alone in four patients and five tests; a papule alone in four patients and five tests; areola and induration together in fourteen patients and thirty-four tests; areola and papule in nineteen patients and thirty-seven tests; induration and papule in two patients and three tests; and areola, induration and papule in seventeen patients and forty-eight tests. Only when either induration or a papule was present was the response regarded as a true reaction.

VARIATION IN HYPERSENSITIVENESS

The patients varied greatly in their degree of hypersensitiveness, one patient reacting to one ten-millionth of a milligram and another only to ten milligrams, a dose one hundred million times as great. Six patients reacted to one ten-millionth of a milligram, two patients to one millionth of a milligram, seven to one one-hundred-thousandth of a milligram, two to one ten-thousandth of a milligram, one to one thousandth of a milligram, one to one hundredth of a milligram, three to one tenth of a milligram, two to one milligram, and one to ten milligrams. Great irregularity was shown in the reactions, patients not always reacting to all the doses larger than the one that gave the first reaction. Only twelve of the twenty-eight reacted to all the doses of tuberculin above the one that gave the minimal reaction. All of the remainder failed to react in one or more instances to a larger dose than the one giving a distinct reaction. In ten of these the injection of both doses was made at the same time. In five of the sixteen, including one of the above group, the larger dose to which they failed to react was the first of a subsequent series of three injections given after a short interval — in some cases two weeks, and in one two months after the previous series. Failure to react therefore may have been due to a lessening of the hypersensitiveness during the interval. In one patient the first reaction was slight and may have been a false reaction. One patient failed to react at all to a dose of one hundredth of a milligram.

In only one patient was there any systemic reaction. A woman, 26 years of age, in the third stage and in the third class of Turban, showed no reaction of any sort to doses of one ten-millionth, one millionth, one one-hundred-thousandth, one ten-thousandth, one thousandth and one hundredth of a milligram. Following the subsequent injection of one tenth of a milligram there appeared an areola a quarter of an inch in diameter and following the simultaneous injection of one milligram an areola half an inch in diameter. Following the injection at the same time, however, of ten milligrams, an abscess developed, which after three weeks still contained fluid. The patient developed a fever which persisted and she became progressively worse. Three other patients developed abscesses at the site of inoculation, not due to infection and resembling the abscesses I have seen occasionally develop after the therapeutic injection of tuberculin and of Sherman's "non-virulent tubercle bacilli vaccine." A boy, J. C., aged seven years, an incipient case in Tur-

CHART 2. SHOWING THE REACTION IN EACH PATIENT TO THE DIFFERENT DOSES OF TUBERCULIN.

The letters are the initials of the patients' names, "Duration" refers to the time from the first to the last injection, — = no reaction, + = slight reaction, ++ = moderate reaction, +++ = marked reaction.

Patient	S. G.	J. R.	C. C.	Y. D.	M. C.	J. P.	J. Y.	R. P.	J. B.	D. A.	Y. S.	R. G.	E. P.
Duration	2 wks.	2 wks.	2 wks.	2 wks.	2¼ mos.	2¼ mos.	2¼ mos.	2 mos.	2 wks.	2¼ mos.	6 wks.	2¾ mos.	6 wks.
1/10,000,000 mg.	+	—	+	+	—	—	—	—	—	—	—	—	+
1/1,000,000 mg.	—	—	+	+	—	—	—	—	—	—	—	+	+
1/100,000 mg.	++	++	+	—	+	+	++	++	—	++	—	—	—
1/10,000 mg.	?	—	+	+	+++	+	++	—	++	++	—	++	—
1/1,000 mg.	++	+++	++	++	++	+++	+	++	+	++	—	++	+
1/100 mg.	+++	+	++	++	+++	+++	—	+++	+++	+++	—	++	+
1/10 mg.	..	..	..	..	..	..	..	..	..	..	++	..	+++
1 mg.	..	..	..	..	..	..	..	..	..	..	++	..	++
10 mg.	..	..	..	..	..	..	..	..	..	..	..	..	..

CHART 2.—*Continued.*

Patient	R. B.	I. A.	S. K.	C. W.	E. J. M.	I. P.	E. J.	G. R.	H. G.	G. F.	H. J.	W. S.	F. M.
Duration	2 wks.	2 wks.	1 day	2 wks.	1 wk.	1 day	1 wk.	10 days	1 day	1 day	1 day	1 day	1 day
$\frac{1}{10,000,000}$ mg.	+	?	—	+	..	..	—	—	..	..	..	..	..
$\frac{1}{1,000,000}$ mg.	?	?	+	+	—	—	—	—	..	..	..	..	..
$\frac{1}{100,000}$ mg.	—	++	—	+	—	—	—	—	..	..	..	..	..
$\frac{1}{10,000}$ mg.	+	++	..	?	—	?	—	—	..	..	..	..	..
$\frac{1}{1,000}$ mg.	+	++	..	?	?	..	—	+	..	..	..	..	..
$\frac{1}{100}$ mg.	++	++	..	?	+	..	—	—	..	..	..	..	..
$\frac{1}{10}$ mg.	..	..	..	..	+	..	?	—	—	—	+	+	—
1 mg.	..	..	..	..	..	..	?	+++	+	—	+	—	+
10 mg.	..	..	..	..	..	..	+++	—	+	—	—	—	—

ban's class one, had shown very slight induration and no areola to an injection of one one-hundred-thousandth of a milligram. Ten weeks later he showed a slight papule, a quarter of an inch in diameter, covered with a slight areola, at the site of a one ten-thousandth of a milligram injection, and a marked and indurated papule with redness in the center and a slight areola seven-eighths of an inch in diameter at the site where one hundredth of a milligram had been injected simultaneously. This papule was still hard at the end of a month, which was the way most of the abscesses began, although no abscess developed here. Between these two papules, however, where one hundredth of a milligram had been injected at the same time, a very marked and indurated papule appeared, seven-sixteenths of an inch in diameter, with marked redness and with a moderate areola seven-eighths of an inch in diameter. This papule remained hard and indurated for two weeks, then becoming fluctuating, and shortly afterward disappearing, leaving an area of induration that persisted for several weeks. Another boy, J. R., nine years old, in the first stage and the first class of Turban, who had not reacted to one ten-thousandth of a milligram, developed small abscesses the size of peas one week after the injection at the same time of one thousandth and one hundredth of a milligram, the former having shown a marked and indurated papule and a slight areola, five-eighths of an inch in diameter, and the latter a slight papule without much induration and a slight areola, three quarters of an inch in diameter. A girl, R. G., aged twelve years, in the first stage and the first class of Turban, on the day following the injection of one tenth of a milligram developed a distinct papule, induration and areola, the latter measuring one inch by an inch and three-eighths, with marked tenderness but no pain. The next day the area was marked, indurated, and tender and surmounted by an acutely inflamed papule, an eighth of an inch in diameter. The areola remained three days but the papule became a pustule or abscess, at the end of two weeks still showing induration, softening, and tenderness.

THE LYMPHATIC CIRCULATION AS A FACTOR

In order to avoid the possibility of the lymphatics carrying part of a larger dose of tuberculin to the place where a smaller dose was injected, the largest dose was injected proximally and the smallest distally. For the same reason the injections were made in a diagonal line so that no two would lie in the same direct line of lymphatic circulation.

By mistake, however, in the first tests that were made the smallest dose was injected proximally and the largest dose distally. As these patients were seven weeks later given the same dosages in the reverse order, they should furnish an interesting example of the difference in reaction of three doses dependent upon their position. The reactions are so variable, however, in the four cases whose records were available, that no conclusion can be drawn.

CHANGES OCCURRING IN THE CHARACTER OF THE INDIVIDUAL REACTION

Another interesting study is furnished by observations of the result of the test at various intervals.

One patient who received injections of one ten-millionth, one millionth and one one-hundred-thousandth of a milligram on the one arm showed the same reactions in all. An hour and a half after the injection there was marked erythema; five hours after there was an area of erythema seven or nine millimeters in diameter; fourteen and a half

CHART 3. SHOWING REACTIONS IN THE SAME PATIENTS FROM THE SAME DOSES WITH THE LARGEST DOSE ON ONE OCCASION INJECTED DISTALLY AND ON ANOTHER PROXIMALLY.

	8–23–15			10–16–15		
	Proximal 1 / 10,000,000 Mg.	Middle 1 / 1,000,000 Mg.	Distal 1 / 100,000 Mg.	Distal 1 / 10,000,000 Mg.	Middle 1 / 1,000,000 Mg.	Proximal 1 / 100,000 Mg.
S. G.	—	—	—	+	—	++
J. R.	—	+	+	—	—	++
C. C.	+	?	+	+	+	+
Y. D.	+	+	?	+	+	—

hours after there was a pink areola five millimeters in diameter. Forty-five hours after there was a slight elevation and the pink areola was seven millimeters in diameter. Sixty-five hours after the injection there was a slight areola one centimeter in diameter and a slight elevation.

Forty reactions in fifteen patients were examined both on the day following and on the second day following the injection. The reaction was greater after forty-eight hours than after twenty-four hours in seven cases and ten tests, less in twelve cases and twenty-five tests, and the same in four cases and five tests. I have no notes for the third and fourth days. One patient, who showed no reaction after twenty-four hours, showed elevation and a slightly red areola after five days. In another case the papule was still hard and raised on the sixth day. I have no notes for the seventh day. A marked reaction was noted on the eighth day in a test which showed nothing after twenty-four hours and a diminishing reaction on the fifth day. I have then no records until the fifteenth day, when the reaction was observed in nine patients and twenty-seven tests. The reaction was greater fifteen days after the test than it was on the day after in three cases and seven tests and greater than on the second day after the test in seven cases and thirteen tests. It was less than on the day after the test in eight cases and sixteen tests, and than two days after the injection in seven cases and eight tests. It was the

CHART 4. SHOWING THE CHARACTER OF THE REACTION AFTER DIFFERENT INTERVALS.

	Internal Reaction	24 Hours				48 Hours				15 Days			
		Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.
	Milligrams												
R. G...	1/1,000	−	+	++	−	−	++	++	+	++	++	−	−
	1/100	++	++	+	+	++	+	+	+	++	++	−	−
	1/10	++	++	++	+++	+++	+++	++	+	++++	+++	−	++
E. P...	1/1,000,000	−	+	+	+	−	−	+	−	−	+	−	−
	1/100	−	+	+	+	−	−	−	−	−	++	−	−
	1/10	−	+++	++	++	−	++	++	−	++	+++	−	−
S. G. .	1/100	+	+	+	−	−	−	−	−	−	−	−	−
	1/10	+	+	+	−	−	+	−	−	−	−	−	−
	1 mg.	++	+++	+	−	−	+	−	−	−	−	−	−
C. C...	1/100,000	+	−	+	−	−	+	++	−	..	..	...	..
J. Y...	1/100	−	+	+	−	−	−	−	−	−	−	−	−
	1/10	+	++	+	−	+	−	−	−	−	−	−	−
	1 mg.	++	+++	++	−	+	+	−	−	++	++	−	−

CHART 4.— *Continued.*

	Internal Reaction	24 Hours				48 Hours				15 Days			
		Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.
	Milligrams												
R. P...	1	—	++	+	+	—	+++	++	++	—	+	—	—
	1,000												
	1	—	+	+	+	—	—	++	++	—	+	+	—
	100												
	1	++	+++	++	+++	++	++	++	++	—	++	+	—
	10												
J. B....	1	—	++	+	+	—	—	—	—	—	—	—	—
	1,000												
	1	—	++	+	++	—	—	—	—	—	+	—	—
	100												
	1	+	++	++	+++	+	+	—	—	—	++	—	—
	10												
D. A.	1	—	+	+	++	—	—	—	—	—	—	—	—
	100,000												
	1	—	+	+	+	—	—	—	—	—	—	—	—
	10,000												
	1	+	++	+	—	—	+	—	+	+	+	+	—
	1,000												
M. C..	1	—	++	++	—	+	—	—	—	—	+	—	—
	10,000												
	1	+	+++	++	—	++	+	++	—	—	+	+	—
	1,000												
	1	—	+	+	++	+	+	—	—	—	+	+	—
	100												

CHART 4.—*Continued.*

	Interval	24 Hours				48 Hours				15 Days			
	Reaction	Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.	Papule	Indur.	Areola	Tend.
	Milligrams												
J. P...	1/1,000	−	+	+	++	−	+	+	−	+	++	++	−
	1/100	−	+	+	++	−	−	−	−	++	++	++	+
	1/10	−	+	+++	+	−	+	+++	++	++	+++	−	−
L. A...	1/100,000	++	++	+	−	−	++	++	−	..	..	..	..
C. W..	1/10,000,000	−	−	++	−	+	+	++	−	..	..	..	..
	1/1,000,000	−	−	++	−	+	+	++	−	..	..	..	..
	1/100,000	−	−	++	−	+	+	++	−	..	..	..	..
R. V..	1/1,000,000	++	+	++	−	+++	+	++	−	..	..	..	..
	1/1,000,000	++	+	++	−	+++	+	++	−	..	..	..	..
	1/100,000	++	+	++	−	+++	+	++	−	..	..	..	..
E. G..	1/1,000	−	−	+	+	−	−	−	−	..	..	..	..
	1/100	+	+	+++	+	+	+	+	+	..	..	..	..
	1/10	+	+	+++	+	+	+	+	+	..	..	..	..
G. P...	1/1,000,000	−	−	+	−	−	−	−	−	..	..	..	..
	1/10,000	−	−	+	−	−	−	+	−	..	..	..	..

same as on the day following the injection in five cases and five tests and as on the second day after in four cases and five tests. A tender lump was noted on the sixteenth day in one patient and an abscess on the eighteenth day in another. Five patients were observed on the twenty-second day after injection. In one a scar and induration marked the places where on the day following the injections there had been only a slight papule and a slight induration respectively. A slight papule and marked induration were seen in another patient where on the first day there had been slight induration at one spot and at another the reaction had been negative. One showed nothing where there had been very slight induration and another showed nothing where there had been very slight induration. Another showed no induration where there had been very slight induration at one place and fairly marked induration at another. One showed slight induration where the induration had been marked. One exhibited a papule and marked induration where there had been a very slight papule and marked induration and also where there had been no papule but marked induration. A papule was still palpable in one case on the twenty-third day. Induration following an abscess was present on the twenty-eighth day in one patient. On the thirty-sixth day in another patient discoloration, papule and induration were observed where only slight induration had been noted on the day following the injection.

DECREASE IN HYPERSENSITIVENESS

Fifteen patients were again tested from two months and a quarter to five months and a half after the degree of hypersensitiveness had been first determined. Five reacted in about the same manner as before. Four reacted to ten times the previous minimal reaction dose, three to one hundred times, one to more than a hundred times and one to a thousand times, while one reacted to one hundredth of the previous minimal dose that produced a reaction.

RELATION BETWEEN TUBERCULIN HYPERSENSITIVENESS AND TUBERCULIN TOLERANCE

In these fifteen cases it was also possible to study the relation between tuberculin hypersensitiveness and tuberculin tolerance. Nine patients were given by mouth as an initial therapeutic dose the exact amount that produced the minimal intracutaneous reaction, two were given one-tenth of this amount, two ten times this amount, and two one hundred times this amount. The initial dose was one one-hundred-millionth of a milligram in one case, one one-hundred-thousandth of a milligram in eleven cases, one ten-thousandth of a milligram in one case, and one hundredth of a milligram in two cases. In no case was the initial dose followed by either a favorable or an unfavorable reaction. My method of giving tuberculin is to hold the dose when it is followed by a favorable reaction, to diminish it when it is followed by an unfavorable reaction, and to in-

CHART 5. SHOWING A DECREASE IN HYPERSENSITIVENESS AFTER AN INTERVAL OF SEVERAL MONTHS.

Patients	S. G.		J. R.		C. C.		Y. D.		M. C.		J. P.		J. Y.		R. P.	
Internal	5½	mos.	5	mos.	5	mos.	5	mos.	2¼	mos.	2¼	mos.	2¼	mos.	2¾	mos.
Milligrams																
1/10,000,000	+	..	—	..	+	..	+	..	—	..	—	..	—	..	—	..
1/1,000,000	—	..	—	..	+	++	+	..	—	..	—	..	—	..	—	..
1/100,000	++	..	++	++	+	?	—	..	+	..	+	..	++	..	++	..
1/10,000	?	..	—	+	+	++	+	..	+++	++	+	..	++	..	—	..
1/1,000	++	..	+++	++	++	..	++	..	++	++	+++	?	+	..	++	++
1/100	+++	+	+	..	++	..	++	+	+++	+	+++	+	—	?	+++	+
1/10	..	+	..	..	..	..	..	++	..	..	..	+	..	++	..	+++
1	..	+++	..	..	..	..	..	++	..	..	..	..	..	+++	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

CHART 5.— *Continued.*

Patients Internal	J. B.		D. A.		Y. S.		R. G.		E. P.		R. B.		I. A.	
	2¼	mos.	2¼	mos.	4	mos.	2¼	mos.	3½	mos.	5	mos.	5	mos.
Milligrams														
1/10,000,000	—	..	—	..	—	..	—	..	+	..	+	..	?	..
1/1,000,000	—	..	—	..	—	..	+	..	+	..	?	..	?	..
1/100,000	—	..	++	+	—	..	—	..	—	..	—	..	++	..
1/10,000	++	..	++	+	—	..	++	..	—	..	+	++	++	++
1/1,000	+	++	++	++	—	..	++	+	+	+	+	?	++	++
1/100	+++	++	+++	..	—	?	++	+++	+	+	++	++	++	++
1/10	..	++	..	..	++	+	..	++	+++	++	..	..	..	..
1	..	..	..	..	++	+++	..	..	++	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..

CHART 6. SHOWING THE ALTERATION IN TUBERCULIN HYPERSENSITIVENESS FOLLOWING A COURSE OF TUBERCULIN TREATMENT:

A comparison of the dose of tuberculin administered therapeutically by mouth with that producing a reaction both before its administration and again several months later during the course of tuberculin treatment; and the effect of the tuberculin given therapeutically in reducing the temperature and producing general benefit.

Patient	Date	Intradermal Test in Milligrams	Date	Dose of Tuberculin in Milligrams	Benefit	Reduction of Temp.	Date	Dose of Tuberculin in Milligrams	Benefit	Reduction of Temp.	Date	Intradermal Test in Milligrams
S. G.	10-16-15	1/100,000	11-1-15	1/100,000	+	—	4-15-16	1/20	+	+	4-15-16	1*/100
J. R.	10-16-15	1/100,000	11-1-15	1/100,000	—	—	3-25-16	1/100	+	—	3-25-16	1*/100,000
C. C.	10-16-15	1*/10,000,000	11-1-15	1/100,000,000	+	—	3-25-16	1/100,000,000	+	+	3-25-16	1*/1,000,000
Y. D.	10-16-15	1*/10,000,000	11-1-15	1/100,000	+	?	3-25-16	1/5	+	?	3-25-16	1*/100
M. C.	11-27-15	1/100,000	12-5-15	1/100,000	+	?	4-15-16	1/2,000	+	?	4-15-16	1*/10,000
J. P.	11-27-15	1/100,000	1-2-16	1/100,000	+	—	4-15-16	1/10	+	?	4-15-16	1/100
J. Y.	11-27-15	1/100,000	12-5-15	1/100,000	+	..	4-15-16	3/100	+	—	4-15-16	1/10
R. P.	11-27-15	1/100,000	12-5-15	1/100,000	—	—	4-15-16	3/100	+	+	4-15-16	1*/1,000
J. B.	2-5-16	1/10,000	2-20-16	1/10,000	?	—	4-15-16	1/100	—	+	4-15-16	1*/1,000
D. A.	11-27-15	1/100,000	12-5-15	1/100,000	+	—	4-15-16	1/5,000	+	—	4-15-16	1*/100,000
R. G.	11-27-15	1/1,000,000	12-5-15	1/100,000	+	—	4-15-16	1/100	+	+	4-15-16	1*/1,000
R. B.	10-16-15	1/10,000,000	11-1-15	1/100,000	?	—	3-25-16	3/10,000	?	?	3-25-16	1*/10,000
I. A.	10-16-15	1/100,000	10-30-15	1/100,000	—	+	3-25-16	1/100	+	—	3-25-16	1*/10,000
Y. S.	11-27-15	1/10	12-5-15	1/100	+	—	3-25-16	3/10	+	+	3-25-16	1*/10
E. P.	10-30-15	1/1,000	12-5-15	1/100	..	—	4-15-16	1/10	+	+	4-15-16	1/1,000

* Smallest amount tested.

CHART 7. SHOWING DEGREE OF TUBERCULIN HYP ERSENSITIVENESS ACCORDING TO AGE, SEX, STAGE AND PROGRESS OF THE DISEASE.

	Total	1/10,000,000 mg.	1/1,000,000 mg.	1/100,000 mg.	1/10,000 mg.	1/1,000 mg.	1/100 mg.	1/10 mg.	1 mg.	10 mg.
1st stage	19	5 1*	2	6	1 1* 1†	1	0	0	1	
2nd stage	6	0	0	1	1	1†	0	1 1†	1	
3rd stage	3	0	0	0	1	0	1	0	0	1
Male	13	1	1	3	3	1	1	1†	2	
Female	15	4 1*	1	4	1* 1†	0 1†	0	1	0	1
10 yrs. and under	15	5 1*	0	5	1 1* 1†	0	0	1		
11 to 20 yrs.	4	0	2	2						
21 to 30 yrs.	5	0	0	0	0	1 1†	1	0	1	1
31 to 40 yrs.	1								1	
41 to 50 yrs.	1							1†		
51 to 60 yrs.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
61 to 70 yrs.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Improving	22	5 1*	2	7	1 1* 1†	1 1†	0	1	1	0
Stationary	6	0	0	0	2	0	1	1†	1	1

* = Did not react to a smaller dose.
† = Tested with O.T. (all the others were tested with T.R.)

crease it when it fails to produce any reaction at all. The early course of tuberculin treatment was apparently of benefit in nine cases, of possible benefit in two cases, and of no benefit in four cases. It apparently reduced the temperature in one case, reduced it for a time in two cases but had no lasting or definite effect in the remainder. There were no untoward effects in any case. After a period varying from two months to five months and a half the therapeutic dose of tuberculin had been increased until it was ten times the initial dose in one case, twenty times in one case, thirty times in two cases, fifty times in one case, a hundred times in one case, a thousand times in five cases, three thousand times in one case, five thousand times in one case, and twenty thousand times in one case. In one case the dose remained the same.

The actual doses were one one-hundred-millionth of a milligram in one case, one five-thousandth of a milligram in one case, three ten-thousandths of a milligram in one case, one two-thousandth of a milligram in one case, one hundredth of a milligram in five cases, three hundredths of a milligram in two cases, a twentieth of a milligram in one case, a tenth of a milligram in one case, a fifth of a milligram in one case, and three tenths of a milligram in one case. These doses caused favorable reactions in three patients and unfavorable reactions in none; they apparently produced beneficial results in thirteen, possibly in one, and were of no benefit in one; they apparently depressed the temperature in seven patients and possibly in four others (having no such effect in four); and caused harmful effects in none. The intracutaneous test made at this time showed a striking correspondence between the dose clinically determined as the appropriate one and that giving a minimal reaction. The latter was the same in one case, less than a tenth of the therapeutic dose in five cases, one tenth in two, between a tenth and a hundredth in three, a hundredth in two, a thousandth in one and a hundred times in one.

INFLUENCE OF AGE, SEX, STAGE, AND PROGRESS OF THE DISEASE

Studying the minimal reactions after grouping the patients according to age, sex, stage of disease, and progress, certain tendencies are observed. A greater degree of hypersensitiveness seemed to be present in the young, in females, in the first stage, and in improving cases.

In conclusion I wish to express my thanks to Dr. Enders of the Eagleville Sanatorium for Consumptives, to Dr. Collins of the Home for Consumptives, Chestnut Hill, and to Dr. H. B. Cohen, a former interne at the Jewish Hospital, for the assistance they rendered in carrying out these tests.

THE OCCURRENCE OF LIVING TUBERCLE BACILLI IN RIVER WATER CONTAMINATED BY SEWAGE FROM A HEALTH RESORT

By Lawrason Brown, M. D., S. A. Petroff, and F. H. Heise, M. D.

Saranac Lake

There are many missing links in the etiologic chain in tuberculosis and this paper is the outcome of an attempt to supply from time to time some of these missing links. Several years ago a number of observers claimed that tubercle bacilli occurred in the feces of a large number of patients with pulmonary tuberculosis. We attempted to verify this and Laird and Kite, in the laboratory of the Trudeau Sanatorium, found that the feces contained viable tubercle bacilli in ninety per cent. of all patients with open lesions. We now question if this figure is not too low, for one of us (Petroff) found them in all of thirty-two cases examined and was able to cultivate them, which as far as we know, no one had done before, in fifty-nine per cent. The ease with which guinea pigs could be infected with tubercle bacilli in the feces suggested that a study should be made of water of streams contaminated with sewage. The sewerage system of Saranac Lake at present empties into the Saranac River just below the village. Only four or five small houses in the whole village are not connected with this system. We studied the surface and deeper waters, and in some instances the mud, above and at the outlet of the sewer and at different distances down stream (200 yards, 400 yards, 2.9 miles — measured along a road which does not closely parallel the river — 3.5 and 12 miles). These distances were determined by the occurrence of bridges across the river.

The flow of the stream was estimated to be about 2 to 4 miles per hour.

THE TECHNIC

Large bottles were used to collect the water at the outlet of the sewer. To obtain the water at different levels the covering of the mouth of the bottle was left in place until the bottle was immersed to that level.

Further down the river a different method was used for studying the surface contamination. Strips or bags of sterile cheesecloth were attached to wires and stretched across the surface of the stream and allowed to remain in position from one to two hours, when they were put into sterile covered pails and carried to the laboratory.

The cloth was very carefully washed in sterile water. The wash water was then put into wide mouthed bottles, saturated with NaCl and let stand in the dark for several hours. At the end of that time the scum

was collected with sterile spoons and transferred to 50 c. c. centrifugal tubes. Ten c. c. of normal NaOH was added to each tube which was incubated at 37° for one-half hour. The contents of the tubes were then neutralized with normal HCl, centrifugalized, and part of this sediment was studied microscopically, part inoculated into egg media, and part injected into guinea pigs.

THE CULTURES

All the cultures were contaminated, due very likely to the presence of many molds and spore forming organisms in the river water. At this time the gentian violet media (Petroff) was not in use.

THE MICROSCOPIC STUDY

Every smear preparation but two, taken from below the surface, from the outlet of the sewer to a point 3.5 miles down stream, showed the presence of acid-fast organisms. No acid-fast organisms were found above the outlet or 12 miles below the outlet.

THE INOCULATION OF GUINEA PIGS

Our work upon the feces does not incline us to believe that acid-fast organisms other than tubercle bacilli occur frequently in the feces of tuberculous patients, for under certain conditions we have been able to infect guinea pigs in nearly every instance where we found acid-fast organisms in the feces of tuberculous patients. It will be noted from the table that acid-fast organisms occurred in most of the specimens, less often deep in the water than upon the surface as far at least as 3.5 miles from the mouth of the sewer. Unfortunately the next point at which we judged we could study the water was at least 12 miles below the sewer's outlet. Here no acid-fast organisms were found, but colon bacilli occurred in small numbers. We believe these acid-fast organisms are tubercle bacilli, for from the sewer's mouth to a distance of at least 3 miles down stream these acid-fast organisms were capable of producing tuberculosis in guinea pigs, when the sun was not shining. On sunny days the acid-fast organisms when obtained 2.9 miles down stream produced no tuberculosis. Where we could discover no particles of feces in the water we found no viable tubercle bacilli.

The water above the outlet contained no acid-fast organisms on smear.

It should be noted that Jessen and Rabinowitch at Davos found tubercle bacilli only 100 meters below the outlet of the sewer. (Zeit. fur Tub., 1910; XVI, 275.)

Distance from Sewer Mouth	Location of Sample: Surface	Deep	Mud	Date & Time	Acid-fast Organisms	Guinea Pigs	Cultures Contaminated
Mouth		+		25–vi–14 9:30 A. M. Sunny	++	A. Tub. B. Tub.	+
Mouth	+			25–vi–14 9:30 A. M. Sunny	++	A. Died. B. Tub.	+
Down stream 200 yards	+			25–vi–14 10 A. M. Sunny	+	A. Tub. B. Tub.	+
400 yards	+			25–vi–14 10 A. M. Sunny	+	A. Tub. B. Tub.	+
400 yards		+		25–vi–14 10:30 A. M. Sunny	+	A. Tub. B. Non-Tub.	+
2.9 miles	+			1–viii–14 10 A. M. Cloudy	+ Pus Cells	A. Lost. B. Tub.	+
2.9 miles		+		1–viii–14 10 A. M. Cloudy	0	A. Non-Tub. B. Non-Tub.	+
3.5 miles	+			1–viii–14 10:30 A. M. Cloudy	+	A. Non-Tub. B. Non-Tub.	+
3.5 miles		+		1–viii–14 10:30 A. M. Cloudy	0	A. Non-Tub. C. Non-Tub.	+
2.9 miles	+			25–ix–14 9:30 A. M. Cloudy	+	A. Tub. B. Tub.	+
3.5 miles	+			25–ix–14 10:30 A. M. Cloudy	+	A. Non-Tub. B. Non-Tub.	+
2.9 miles	+			6–vii–15 9:30 A. M. Sunny	+	A. Non-Tub. B. Non-Tub.	+
2.9 miles			+	6–vii–15 9:30 A. M. Sunny	+	A. Non-Tub. B. Non-Tub.	+
3.5 miles	+			6–vii–15 10 A. M. Sunny	+	A. Non-Tub. B. Non-Tub.	+

Distance from Sewer Mouth	Location of Sample: Surface	Deep	Mud	Date & Time	Acid-fast Organisms	Guinea Pigs	Cultures Contaminated
3.5 miles			+	6–vii–15 10:30 A. M. Sunny	+	A. Non-Tub. B. Non-Tub.	+
12 miles	+			12–iv–16 45 min.	0	A. Non-Tub. B. Non-Tub.	—
Above outlet	+			13–iv–16 1 hour	0	A. Non-Tub. B. Non-Tub.	—

SAMPLE 1. From deep water at mouth of sewer.

25–vi–14 9:30 A. M. Sunny

Slides: Positive, numerous acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Sept. 15, 1914, killed.

Inguinal glands very much enlarged, abscess at seat of inoculation. Many tubercles in the liver and spleen, few in the lungs; bronchial glands very much enlarged. Smears from spleen and liver positive to acid-fast organisms.

SAMPLE 2. From surface water at mouth of sewer.

25–vi–14 9:30 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: A died July 31st.

Organs congested; bronchial glands enlarged; smear of suspected parts negative to tubercle bacilli.

Autopsy: B killed Sept. 15, 1914.

Spleen very much enlarged and granular; inguinal glands very much enlarged, liver enlarged, containing many tubercles. Bronchial glands very much enlarged. Smears from the suspected parts showed many acid-fast organisms.

SAMPLE 3. From surface 200 yards down stream.

25–vi–14 10 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: A killed Sept. 15, 1914.

Right inguinal gland size of a large pea, containing thick pus (slide and tubes made). Spleen enlarged and nodular, full of small tubercles. Slide shows gland positive and spleen negative for acid-fast organisms.

Autopsy: B killed Sept. 15, 1914.

Right inguinal gland size of a large pea, containing thick pus (slide and tubes made). Spleen enlarged and nodular, full of small tubercles. Slide showed gland positive and spleen negative, for acid-fast organisms.

SAMPLE 4. From surface 400 yards down stream.

25–vi–14 9:30 A. M. Sunny

Slides: Positive for acid-fast organisms.

Cultures: Contaminated.

Guinea Pigs: A and B.

Autopsy: A killed Sept. 15, 1914.

Sup. inguinal glands enlarged; spleen enlarged and nodular; few tubercles. Slide showed gland positive for acid-fast organisms.

Autopsy: B.

Sup. inguinal glands enlarged; spleen enlarged and nodular. Slide showed gland and spleen positive for acid-fast organisms.

SAMPLE 5. From deep water 400 yards down stream.

25–vi–14 10:30 A. M. Sunny

Slides: Positive for acid-fast organisms.

Cultures: Contaminated.

Guinea Pigs: A and B.

Autopsy: Killed Sept. 15, 1914.

A: Inguinal glands slightly enlarged, spleen slightly enlarged but not nodular, lung apparently normal, liver normal. Smears showed only few acid-fast organisms.

B: Inguinal glands slightly enlarged, lung and liver normal, no acid-fast organisms on the smears.

SAMPLE 6. From surface 2.9 miles down stream.

1–viii–14 10 A. M. Cloudy

Slides: Positive for acid-fast organisms; some pus cells.

Cultures: Contaminated.

Guinea Pigs: A and B. A was lost.

Autopsy: B killed Sept. 22, 1914.

Inguinal glands very much enlarged; spleen enlarged and nodular; few tubercles in liver; lungs apparently normal; bronchial glands very much enlarged; spleen, liver and glands showed numerous acid-fast organisms.

SAMPLE 7. From deep water 2.9 miles down stream.

1–viii–14 10 A. M. Cloudy

Slides: Negative for acid-fast organisms.

Cultures: Contaminated.

Guinea Pigs: A and B.
Autopsy: Killed Sept. 22, 1914.
Apparently normal with the exception of the bronchial glands which were slightly enlarged. Smear preparation showed no acid-fast organisms.

SAMPLE 8. From surface 3.5 miles down stream.

1–viii–14 10:30 A. M. Cloudy

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Sept. 22, 1914.
A: Inguinal glands appeared to be slightly enlarged; spleen, liver and lung normal; glands were mashed but no acid-fast organisms found.
B: Apparently normal. No acid-fast organisms found.

SAMPLE 9. From deep water 3.5 miles down stream.

1–viii–14 10:30 A. M. Cloudy

Slides: No acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and C.
Autopsy: Sept. 22, 1914.
A: Apparently normal.
C: Apparently normal.

SAMPLE 10. From surface water 2.9 miles down stream.

25–ix–14 10 A. M. Cloudy

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Nov. 2, 1914.
A: Superficial inguinal glands slightly enlarged; spleen very much enlarged and nodular; few tubercles in lung and liver; smears positive for acid-fast organisms.
B: Superficial inguinal glands slightly enlarged; spleen slightly enlarged but not nodular; lungs apparently normal. Smears showed a few acid-fast organisms.

SAMPLE 11. From surface 3.5 miles down stream.

25–ix–14 10:30 A. M. Cloudy

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Nov. 2, 1914.
A: Abscess at seat of injection. No tuberculosis.
B: No tuberculosis.

SAMPLE 12. From surface 2.9 miles down stream.

6–vii–15 9:30 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Oct. 2, 1915.
A: Apparently normal.
B: Apparently normal.

SAMPLE 13. From mud 2.9 miles down stream.

6–vii–15 9:30 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Oct. 2, 1915.
A: Apparently normal.
B: Apparently normal.

SAMPLE 14. From surface 3.5 miles down stream.

6–vii–15 10 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Oct. 2, 1915.
A: Apparently normal.
B: Apparently normal.

SAMPLE 15. From mud 3.5 miles down stream.

6–vii–15 10 A. M. Sunny

Slides: Positive for acid-fast organisms.
Cultures: Contaminated.
Guinea Pigs: A and B.
Autopsy: Killed Oct. 2, 1915.
A: Apparently normal.
B: Apparently normal.

SAMPLE 16. From surface 12 miles down stream.

Collected 45 min. 12–iv–16

Slides: Negative for acid-fast organisms.
Cultures: Negative.
Guinea Pigs: A and B.
Autopsy: June 7th, 1916. Lungs, liver, spleen and glands apparently normal. (A and B.)

Sample 17. Above outlet of sewer.

Collected 1 hour. Surface. 13–iv–16.

Slides: Negative for acid-fast organisms.
Cultures: Negative.
Guinea Pigs: A and B.
Autopsy: June 7th, 1916. Lungs, liver, spleen and glands apparently normal. (A and B.)

THE DIAZO AND UROCHROMOGEN REACTIONS IN PULMONARY TUBERCULOSIS *

By H. J. Corper, M.D., and F. F. Callahan, M.D.
Chicago
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A test which will in the majority of cases make it possible to foresee prognostically the outcome of a case of tuberculosis, is of inestimable value to the clinician. Such a test, it was hoped by many, had been found when as result of a study covering a period of 5 or 6 years Weisz [1] reported on the urochromogen reaction, a new test discovered by him and intended to displace the well known Ehrlich's diazo reaction. As a result of his investigations Weisz was led to conclude that there are two urochromogens or precursors of the yellow urinary pigment, one of these, urochromogen α, which can be oxidized by potassium permanganate, potassium persulphate, etc., into urochrom, and the other unochromogemβ which gives the diazo reaction of Ehrlich. Weisz [2] in a further contribution states that the urochromogen reaction in the urine precedes the diazo reaction and answers all its purposes. He gives the ultimate history of 23 patients tested in this way, confirming the great prognostic value of this test. Still later he [3] states the appearance of urochromogen in the urine indicates that a local circumscribed tuberculous process has become generalized. The urochromogen disappears when the organism gets the upper hand, and the longer the reaction has existed the graver the prognosis.

Schnitzker [4] was able to separate and differentiate urochromogen α and β but only qualitatively chemically, but his work indicated that they were distinct chemical substances. Heflebower,[5] the earliest American observer to use the urochromogen test, concluded as a result of observations on 39 cases of pulmonary tuberculosis, that the urochromogen test is a better index as to prognosis than the diazo reaction. Paranhos and Giolito [6] always obtained a negative urochromogen reaction in 50 healthy individuals and obtained positive reactions in all but 5 of 50 tuberculous patients, 3 of the latter being far advanced. The reaction was not dependent upon the severity of the disease. Tuliato [7] found the urochromogen test positive in 67 per cent. of all fatal cases in various diseases; it is not specific for any one disease, but is a sign of the gravity of the condition, and he explains it as due to oxidation of albuminoid substances originating in

* (From the Laboratories of the Municipal Tuberculosis Sanitarium of the City of Chicago.)

the decomposition of cells as the result of direct or indirect action of pathogenic organisms.

Cummings [8] as a result of the examination of 100 cases concludes that the urochromogen and diazo reactions appear in the urine of a majority of the patients in a late stage of pulmonary tuberculosis. These reactions do not appear, however, until long after a correct unfavorable prognosis is possible by careful clinical examinations. Gullbring [9] obtained only 2 cases out of 168 (mostly advanced stage of tuberculosis) in which the diazo reaction was positive and urochromogen negative, in 114 of these the findings were parallel, they were both negative in 88 and positive in 26. In all the others (37 per cent.) the urochromogen was positive with negative diazo and these revealed, besides the pulmonary lesions, signs of amyloid disease. The urochromogen test was positive in 90 per cent. of the amyloid cases while the diazo in only 20 per cent. Metzger and Watson [10] as a result of urochromogen examinations in 113 cases of tuberculosis conclude that its presence in the urine is of unfavorable prognostic import for the time being. Its persistent presence in spite of proper treatment probably means a hopeless prognosis. Its absence is generally, although not invariably, of good prognostic import regardless of clinical appearances. A prompt disappearance and continued absence is a favorable sign. Burgess,[11] as a result of examinations of 171 tuberculous and 650 non-tuberculous patients (suffering from other diseases), concludes that the urochromogen test is of no prognostic value in non-tuberculous diseases; a positive reaction in advanced tuberculosis indicates progress of the disease with probable termination in 3 to 6 months, while a negative test is of no value. Sinclair [12] as a result of the examination of 146 cases of pulmonary tuberculosis by both the diazo and urochromogen tests concludes that a change in reaction from both negative to a negative diazo and positive urochromogen is more favorable than to a positive diazo and negative urochromogen. Both positives generally indicate an early death. A change from a positive diazo and negative urochromogen is favorable only on reversal (that is, to a negative diazo and positive urochromogen). If the urochromogen does not appear concomitantly with the disappearance of the diazo the prognosis is bad.

In order to note whether there is any relation or difference between the occurrence of the diazo and urochromogen reactions in the various stages of pulmonary tuberculosis, 350 cases were divided according to the National Association classification into incipient, moderately advanced and far advanced, and these were then further divided into improved and unimproved to show whether there was any relation between these reactions and the progress of the disease. The results of this classification is seen in Table I.

(The details of the tables given in this report will not be gone into, as the complete report is to appear elsewhere). From this table it is to be noted especially that the majority of the incipient cases gave negative reactions with both tests while a few of even improved cases gave positive urochromogen tests; the moderately advanced cases show in general about

the same results as obtained in the incipient cases. The far advanced cases on the other hand reveal a larger number of positive diazo and urochromogen tests. The large number of negative reactions in the far

TABLE I

CHANGE OF REACTION ADMISSION AND SUBSEQUENTLY CLASSIFIED

			D+U+	D+U—	D—U+	D—U—
Incipient Cases	Initial Examination				8 2 Single Exam's.	74 25 Single Exam's.
Total-exam's-197	Subsequent Examinations Improved	D+U+				
		D+U—				
		D—U+				4
On 82 patients		D—U—			4	
	Subsequent Examinations Unimproved	D+U+				
		D+U—				
		D—U+				1
		D—U—			2	44
Moderately Advanced Cases	Initial Examination		4 4 Single Exam's.	1 1 Single Exam.	12 6 Single Exam's.	95 35 Single Exam's.
Total-exam's-256	Subsequent Examinations Improved	D+U+				
		D+U—				2 1-with pleural effusion
		D—U+				3
On 112 cases		D—U—			6	35
	Subsequent Examinations Unimproved	D+U+				
		D+U—				2 1-with pleural effusion
		D—U+				3
		D—U—				15
Far Advanced Cases	Initial Examination		25 9 Single Exam's.	5 2 Single Exam's.	13 2 Single Exam's.	113 21 Single Exam's.
Total-exam's-502	Subsequent Examinations Improved	D+U+				2 1-with erysipelas
		D+U—	1			
		D—U+				2
On 156 cases		D—U—	6		5	22
	Subsequent Examinations Unimproved	D+U+	5		1	10
		D+U—	1	1	1	
		D—U+			1	3
		D—U—	3	2	3	53

advanced cases and an endeavor to find an explanation for this made it seem advisable to further classify 103 far advanced cases into cases with far advanced physical signs and few symptoms as far advanced fibroids and those showing far advanced signs and active symptoms as far advanced active cases. The result of this classification is seen in Table II.

TABLE II

COMPARISON OF REACTIONS IN FAR ADVANCED FIBROID AND FAR ADVANCED ACTIVE CASES

			D+U+	D+U−	D−U+	D−U−
Far Advanced Fibroid Cases	Initial Examination		5—1-Single Exam. 3-Acute exacerbations. 1 spontaneous pneumothorax on admission.	2	4	63 5-Single Exam's.
	Subsequent Examinations	D+U+				3 including 1-enteritis 2-acute exacerbations
		D+U−				
		D−U+			1	4
		D−U−	4	2	3	51
Far Advanced Active Cases	Initial Examination		7 4-Single Exam's.	1	2	19 3-Single Exam's.
	Subsequent Examinations	D+U+	2		2	10
		D+U−	1			1
		D−U+				
		D−U−		1		5

It is to be noted briefly that the far advanced fibroid cases usually gave negative reactions to both tests except when there existed some other condition to explain the presence of a reaction. On the other hand the far advanced active cases in the majority of the cases were either positive on initial examinations or became so subsequently.

The terminal cases, of which there were 60, were tabulated separately in Table No. III.

TABLE III

CLASSIFICATION OF REACTIONS IN TERMINAL CASES

		D+U+	D+U−	D−U+	D−U−
Initial Examination		34 15-Single Exam's.	6 3-Single Exam's.	5 4-Single Exam's. 1-Terminal Hemorrhage	15 3-Single Exam's. 1-Terminal Hemorrhage
Subsequent Examinations 133 examinations on 60 cases	D+U+	14	2		4
	D+U−	2			
	D−U+	2 including 1-T. B. Meningitis		1	3 including 1-Terminal Hemorrhage 1-acute peritonitis
	D−U−	1 including 1-T. B. Meningitis	1		5 including 2-T. B. Meningitis. 1-Terminal Hemorrhage 1-Acute lobar pneumonia. 1-Acute Cardiac.

It is to be noted from these tabulated results of the findings in terminal cases that practically all cases dying of pulmonary tuberculosis reveal positive reactions by both tests at some time during the last 6 months of their disease. Those cases which gave negative reactions to both tests during the last 6 months of the disease usually died of some acute condition such as pulmonary hemorrhage or tuberculous meningitis, etc. It was noted that cases dying of tuberculous meningitis usually gave negative reactions to both tests; this was especially true of the diazo reaction. Some of these cases were negative during the whole course of the disease, others became negative during the attack of meningitis.

CONCLUSIONS

1. Cases dying of pulmonary tuberculosis give a positive diazo and urochromogen test at some time during the last 6 months of their illness. Whenever both tests are negative during this period death was found to be due to some intervening condition, such as pulmonary hemorrhage, tuberculous meningitis, etc.

2. Cases of chronic fibroid tuberculosis generally give both reactions negative except when same is explicable by some acute exaceration, acute inter-current infection or acute pleural effusion.

3. In active cases of pulmonary tuberculosis when both reactions are positive and remain so for most of the succeeding examinations, it is of grave prognostic import. When both reactions are negative in active cases no stress can be laid upon the findings.

4. There seems to be no regularity between the presence of either reaction, its disappearance to be displaced by the other or by both.

5. The presence of a urochromogen reaction in cases showing no clinical symptoms is of no prognostic value. No diazo reactions were obtained in clinically inactive cases, whereas a number of urochromogen reactions were obtained in such cases.

6. The presence of a diazo or both reactions is a *danger signal* of grave import.

7. Careful clinical observations will, from a prognostic standpoint, give more information than the diazo and urochromogen tests in pulmonary tuberculosis.

8. Wherever possible both tests should be performed, but of the two the diazo should be given the preference.

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DISCUSSION ON PAPER BY DR. CORPER, CALLAHAN, AND MARSHALS

Dr. Karl Schäffle, Philadelphia: Transfer to a different field of activity prevented my making the final report contemplated, but Dr. M. E. Cowen, Cresson, Pa., has been making routine analyses on all cases as follows: —

None of the positive specimens were alkaline when examined. When rendered so by the addition of normal sodium hydroxid solution there was no apparent difference until the sodium hydroxid had been added to excess. Then the characteristic yellow failed to develop an addition of the permanganate solution, but was replaced by a dark blue which quickly disappeared.

Along with the positive urochromogen we have found a very excessive indican reaction.

From the physical findings in these reported cases my conclusions are that the positive reaction in patients with pulmonary tuberculosis is present only when there is an actual destructive process going on. Occurring in an ambulant case we would regard it as a warning that the patient should be at absolute rest in bed. In the moderately advanced case, we may expect soon to find evidence of cavity formation if the reaction remains positive. For the already far advanced case with cavity riddled lungs it is of grave significance. In 93 per cent. of our cases of this type the patients died within four months, and the majority of these within three months.

On the other hand, a continued negative reaction in a urine that previously has been positive appears to indicate at least a temporary cessation or retardation of activity.

About two years ago I read a little paper before the Philadelphia Pathological Society which appeared in the *Journal of the American Medical Association,* October 10, 1914, as follows: —

COMPARISON OF DIAZO AND UROCHROMOGEN TESTS

State Dispensary Cases:	No.	Dead	Per cent.
Positive to both tests	15	1	..
Negative to both tests	75	1	..
Philadelphia Hospital Cases:			
Tuberculosis:			
Positive to both tests	38	16	42
Negative to both tests	137	21	15
Positive U. but neg. D.	13	7	58
Positive D. but neg. U.	2	1	..
Pneumonia:			
Positive to both tests	2	1	..
Negative to both tests	14	4	..
Positive U. but neg. D.	1	..	..

	No.	Dead	Per cent.
Erysipelas:			
Positive to both tests	8	1	..
Negative to both tests	38	1	..
Positive U. but neg. D	2	..	..
Pertussis:			
Positive to both tests	2	..	..
Negative to both tests	14	..	..
Measles:			
Positive to both tests	2	..	..
Negative to both tests	11	..	..

In addition to specimens from the tuberculous, I tested urine from patients with some of the other diseases in which the diazo has been found, as well as a large number of normal specimens. The results in the former were insufficient, and in the latter always negative.

The tests were performed in most cases only on admission, and all the deaths recorded have occurred within four months. The majority of the cases giving a positive reaction were afebrile.

REPORT OF THE COMMITTEE ON RESEARCH

Result of inquiries as to institutions which are desirous of working out some problem and need assistance, financial or otherwise.

Two hundred and thirty-eight (238) letters were originally sent out.

Ninety-four (94) answers were received.

(The detailed reports have already been submitted to the Committee.)

Thirteen (13) sanatoria equipped with laboratories are desirous of aid: 13 want money; 8 want assistants and money.

Fifteen (15) universities or colleges likewise desire aid: 15 want money, 5 of which want assistants.

Four (4) public health laboratories likewise desire aid: 3 want money; 1 wants assistant.

Fifteen (15) institutions of all kinds are engaged in some work or need no assistance.

Seven (7) of these institutions are sanatoria, three (3) are university laboratories or institutes, one (1) is a public health laboratory.

Thirteen institutions wish to take up clinical problems; seventeen general or fundamental ones.

A total of forty-two (42) institutions are doing or express the desire to do some research work in tuberculosis.

At least fifty (50) institutions are probably able and willing to undertake this work, of which number twenty (20) are now engaged in it; of these at least twelve (12) need assistants.

RECOMMENDATIONS

The Committee considers that there is considerable value to be obtained from research work that could be done only with financial assistance. In most cases small sums are required ranging from $300 to $600 per year. It recommends that $5000 be raised as a fund for research. The Committee will then be willing to designate the institutions to receive grants of money, and to offer suggestions as to the work that is most likely in their opinion to be of service.

Edward R. Baldwin, *Chairman.*

SOCIOLOGICAL SECTION

Chairman

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Boston

Secretary

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Chicago

INTERSTATE FACTORS IN THE TUBERCULOSIS PROBLEM

By Homer Folks, LL.D.

New York

I find that my paper does not exactly and specifically deal solely with the matter that is uppermost in your minds. When I was asked to read a paper on this specific subject I declined on the ground that I had no special knowledge of it and my experience did not especially qualify me to express an opinion on it. Then I was asked to read a paper on the general subject of the National Aspects of the Tuberculosis Movement, including some references to this bill. This is what I have done.

Tuberculosis is a local, a State and a national problem. The local and State factors have thus far received far more attention than the national aspects. Yet the national interests involved are perhaps more vital than the local or State interests.

There may be various views and conflicting opinions on the general subject of preparedness but there can be no differences as to certain kinds of preparedness. For peaceful pursuits, as well as for military strength, an adequate supply of competent men is essential. Science has done marvels but it has not yet invented a manless gun. The man behind the gun is still essential, only he must be a more and more competent, intelligent, all around man. It is no accident that the country which has shown the most extraordinary efficiency in the great war is also the country which took the lead in many respects in the cure and prevention of tuberculosis as a national problem. It has been able to put an adequate number of competent men behind the guns.

It is by no means impossible that in a modern war the scale might be turned one way or the other by the results of two or three decades of careful attention to so enormous a cause of inefficiency and death as tuberculosis. The national interest in the prevention of tuberculosis is vital. How it may be expressed and made effective is the essential subject of this paper.

Tuberculosis is primarily a *local problem* from the point of view of remedial effort. It exists everywhere; it must be fought everywhere. It can be dealt with only by the development of local resources of care, cure, and prevention, everywhere. The individual citizen must be taught to recognize the indications that something may be wrong. The local physicians must become able either to make a diagnosis or to see the need of referring the patient to a specialist. There must be local hospitals, local out-patient departments, local visiting nurses, local home supervision, local material aid, local medical inspection. In short, the social forces of every

locality must be mobilized for what we used to call the war or campaign against tuberculosis. We made a conscious effort a few years ago to eliminate the terms "war" and "campaign" in the State of New York, but under present conditions they are again apt.

Tuberculosis is a *State problem* because the State is the unit of legislation and, in considerable degree, of administration. The laws defining the powers and duties of local health officers must be State laws. The laws governing the establishment and conduct of hospitals and sanatoria must be State laws. Some degree of supervision over local health authorities and over hospitals and sanatoria must be exercised by the State. Backward communities should be spurred to action by State authorities. The statistics which record the changing fortunes of the battle from month to month and from year to year must be collected and interpreted by the State. State action, to a large extent, must initiate, coordinate, and try to standardize local action.

Tuberculosis is also, of necessity, *a national problem,* because of the vital national interest involved, and because some degree of uniformity of method and efficiency of results among the 48 sovereign States can only be secured by national action commensurate to the task, and the national significance of its accomplishment. To a considerable degree the States must stand or fall together. The amount of inter-State migration is such that I should suppose that if, by some miracle, all tuberculosis could suddenly be wiped out in any particular State, it would not be many years before a new and promising crop would be sown by arrivals from other States. Furthermore, the expenditure of twenty-two and one-half million dollars for the prevention of tuberculosis in the United States in 1915 could have been made vastly more effective in its results, if the federal authorities had, during the past decade or two, taken that degree of leadership in this field which they have exercised in some other directions in which the material interests involved are more obvious, as for instance, in agriculture.

There are particular phases of the subject, of course, which can be handled only by the federal authorities. The sanitary problems involved in inter-State migration; the inter-State traffic in the alleged "cures" of tuberculosis; the inter-State migration of consumptives, indigent and otherwise, whether in search of health resorts or merely changing their residence for economic reasons — all these problems can be dealt with only by federal authorities.

But far outweighing any or all of these, in my opinion, is the opportunity for the federal authorities to exert a coordinating, standardizing, leadership in relation to the work of States and of local authorities. Hardly a question arises in any State or local tuberculosis activity in which the State and local authorities are not groping for light, wondering what the latest word is from other localities and States and from other countries. Occasionally from perversity, but far more frequently from insufficient information, their well-meant activities are but partially effective. Especially in the very expensive matter of hospital and sanatorium construction and

operation is there need of authoritative leadership. The problems of tuberculosis hospitals are very different from the problems of general hospitals,— because their purpose is different, being segregation or health protection. From the moment at which the county or State authorities begin to consider the question of establishing a tuberculosis hospital, their need of that leadership which only the federal authorities can fully provide, is constant. In the enactment of laws providing for the organization and maintenance of such hospitals; in all the varied questions involved in the selection of the site; in the still more varied questions involved in the planning and construction of the buildings; in the still more complicated and varied problems involved in the organization and operation of the hospital, its medical service, its nursing service, its social service, its equipment, its food, its selection of patients, its control over patients, its relations to the different localities included in its district, and in hundreds of other matters there is crying need for an authoritative statement of the best that has been learned anywhere.

To some extent, of course, the National Association tries, I will not say to fill this field, but to make some impression on it. There are two reasons why we cannot fill it adequately.

In the first place if our income were ten times what it is now we could only make a respectable beginning at the job. Secondly: the federal government has a prestige and an acknowledged authority which a volunteer association can never completely secure. The field of the National Association would seem to me to be rather that of arousing popular interest, helping to shape public opinion, and helping to stimulate adequate action — federal, State and local.

It seems to me obvious that the federal duties above outlined in relation to tuberculosis, should be exercised by the United States Public Health Service, through a definitely established, statutorily organized Division of Tuberculosis. I recognize the fact that each such statutorily organized Division in a sense limits the fluidity of the organization and makes it less possible to throw large forces here or there as the occasion or opportunity may seem to demand. On the other hand, the advantages of a definitely organized Division for so large and vital a subject as the prevention of tuberculosis, seem to me to far outweigh this disadvantage. With the organization of a definite Division it would be obvious to everybody that the federal government was assuming, and proposed to exercise, that leadership in this field which is its right and its bounden duty. State and local authorities would naturally turn to a Division of Tuberculosis of the United States Public Health Service for information, when it might not occur to them to turn to what would be to them a more or less vague and unspecialized United States Public Health Service. Moreover, as the tuberculosis campaign is a long one, and somewhat monotonous, and not always commanding a maximum degree of public interest, there is always the very real danger that any public health department, whether federal, State or local, will not be quite able to resist the temptation to do the thing which, at the moment, commands popular interest, rather than the

thing which is intrinsically most important. Health projects command a popular interest in their inception, rather than in their later progress. Representatives of New York City will, I think, be able to point to occasions on which increased staff, medical and nursing, secured primarily by the activity of tuberculosis workers, and primarily for tuberculosis work, have subsequently been more or less diverted to what have become, for the moment, most popular interests. I am not imputing blame to public officials for seeking to enlarge the volume of popular interest in their work. The extent to which the duties of public departments should be defined in detail in statutes or in appropriation bills, is always a matter of degree; but it has become increasingly clear to me that, not only because of its intrinsic importance, but because of the length and the continuity of the tuberculosis warfare, a consistent and continuous progress can be had only by the establishment of definite Divisions, bureaus, or whatever they may be called, devoted to tuberculosis, in local, State, and federal health services.

Besides this current work of collecting information as to the progress of the tuberculosis movement, not only in our 48 States but in all the civilized world, for the benefit of local authorities, I wish to concur in the suggestion of Dr. Frankel that it is appropriate that the federal authorities should undertake an important piece of research as to the relative importance of the various factors involved in the control of tuberculosis, and as to the possibility of securing a far more adequate control in some locality than now exists. This is no reflection on the nature of the methods already adopted, but rather on their adequacy, for nowhere are we doing anything like as much as we know how to do, and as we have set out to do. The application, however, of 22 or 23 million dollars per year to this subject clearly justifies not only the expenditure by the federal authorities of a sufficient sum to make available the latest information as to what *is* being done, but also of a sufficient sum for original research as to what other and further things *ought* to be done.

As to the pending bill for a federal subsidy to hospitals approved by the United States Public Health Service which receive non-resident indigent cases of tuberculosis, the one fact which seems to me perfectly clear is that there is a very serious difference of opinion as to what the effects of such a measure would be, and that it therefore requires considerably more analysis and discussion than it has yet received. Some considerations having an important bearing on the matter would seem to me to be the following:

There is a general recognition that the States which receive a large migration of destitute or near-destitute tuberculosis patients, are dealing with a serious problem; that the authorities and organizations of those States have, in many cases, shown great consideration to this class of patients; and that such authorities and organizations are entitled to the most cordial and complete cooperation on the part of all organizations and local authorities of the States from which the patients come. For the sake of the patients themselves and in simple justice to the people of

the resort States, we should all endeavor to reduce inter-State migration of the relatively indigent to the lowest terms possible.

Generally speaking, the subsidy plan is not a good one, in that it divides and confuses responsibility, both for financial support, and for administrative control. It is true that the granting of subsidies by national authorities has been made use of largely in Great Britain. In some instances it has been successfully used as a means of raising standards; in others it has not had this result. The British experience is interestingly set forth in a little book—"Grants in Aid"—by Sydney and Beatrice Webb. In this country subsidies have had almost a uniform record of failure, so far as any improvement of standards is concerned. California need look only to its system of State subsidies to orphan asylums over a long term of years to see the system at its worst. Pennsylvania subsidies have probably had little effect, one way or the other, on the methods of the subsidized institutions. In New York the subsidy-receiving organizations have, on nearly all occasions, dominated the machinery which the city has endeavored to set up to regulate them. The pending controversy in that city is an instance of what is likely to happen when the subsidy-granting authority really undertakes to utilize its control of the subsidy for actually and definitely raising standards. A subsidy limited to public institutions is far less dangerous than one applicable to both private and public institutions. The pending bill originally applied to both public and private agencies; a later edition applied to public agencies only; the latest edition applies to both public and private agencies. Should the bill become law, the grants at 75 cents per diem for indigent non-resident patients, would very soon assume large proportions, I should assume, not less than from $4,000,000 to $5,000,000 per annum. We must look forward to active efforts on the part of the recipients of these grants to protect their interests, just as happens in States where subsidies are given. It is humanly certain that when a vacancy occurred in the post of surgeon-general of the United States Public Health Service, the subsidized hospitals receiving four or five million a year, would interest themselves in securing the appointment of a man who, from their point of view, was "safe." It must be expected that when the surgeon-general appeared before a committee of Congress and asked for an appropriation dealing with some new and important public health matter, he would be met by questions from members of the committee coming from the States in which subsidized institutions were largely represented, as to whether he had not established standards which required an expenditure say of $2.00 a day for tuberculosis patients, while the Federal authorities granted only 75 cents per day. Underneath these questions might easily be read a suggestion that if his application were favorably acted upon, he would be expected to deal considerately with institutions in which the members were interested. Also we may look for an annual grist of bills raising the per capita rate; if the United States authorities pay 75 cents per day, why not $1.00; why not $1.50; why not the actual complete cost of maintenance? As this varies in different hospitals and in different localities, how is it to be

determined? These are only instances of the questions which will continually arise and will not down in the operation of the new subsidy plan.

Most of the inter-State migration of tuberculosis patients is, I assume, undesirable. Whether the pending bill would operate to diminish or to increase inter-State migration, of the near-destitute and the destitute, is an open question. Is inter-State migration of indigent consumptives at present increasing or decreasing? If it is decreasing, cannot the rate of decrease be quickened by further educational work?

I agree with the friends of the bill that, if it has important health aspects, they should be the controlling consideration. The New York Tuberculosis Hospital Law cuts loose from all poor-law machinery and is based on entirely different principles. When public health runs counter to the poor law, as it sometimes does, I am for following public health every time. If it can be shown that the enactment of the pending bill would substantially increase the total number of dangerous cases who are segregated in the hospitals, or that it will help to standardize hospitals more effectively than would otherwise be feasible, or that it will substantially diminish inter-State migration of the tuberculous, then it has strong claims to support. Will it do any or all of these things? That seems to me the crux of the question. Taking them up in inverse order:

(1) I see absolutely nothing in the bill which seems to me likely to diminish inter-State migration. The suggestion that it will, on the contrary, increase it, is worthy of careful examination.

(2) As to raising standards, it is obvious that as to the hospitals or sanatoria operating under it, standardization would be enforced. I have no doubt that it would be very well done. Will not these hospitals be a small proportion of the whole, and will the standardization of the great number of unsubsidized hospitals be helped or hindered by the fact that standardization is forced upon the few? Will compulsion in some cases dispose others, who cannot be compelled, to accept higher standards voluntarily? Perhaps, but I doubt it. I cannot help feeling that the whole standardizing process will get ahead further and further if it is put frankly on the voluntary basis of a friendly service. The sight of my neighbor being obliged by force to take medicine, does not predispose me to take it voluntarily; the example of his voluntary acceptance might have great weight with me.

(3) As to its influence upon the total amount of segregation of dangerous cases, will any States, localities, or corporations provide hospital beds in view of this subsidy, who would not provide them otherwise? I think it is obvious that this would not occur unless in those regions which may vaguely be termed health resorts. The number of non-resident cases elsewhere does not seem, from any knowledge at hand, sufficient to influence the volume of hospital construction. In the resort regions, I think that very likely it would. What effect would more and larger hospitals in resort regions have in turn upon inter-State migration? Would not the existence of the larger and more numerous hospitals become generally known? Might not this fact very readily tend to perpetuate or even to

increase migration? Might it not neutralize a campaign against unwise immigration?

Can Uncle Sam successfully establish himself in the resort regions and say to the poor consumptives at large: "You ought not to come here, it is foolish to come, but if you do come I will help to take care of you; or if you are willing to go home, I will send you, if I can arrange for your hospital care after you get there"? Which would prevail, his warning or his promise? Obviously, these additional beds, if built, will not be where the patients ought to be, but where we think they are likely to be. Is it, or is it not, desirable that Uncle Sam should assist those who go where they should not go, and do nothing for those who stay where they belong?

These, then, seem to me to be the three points on which discussion of the Kent Bill might well be focused this afternoon:

1. Its effect on inter-State migration.
2. Its effect on raising hospital standards.
3. Its effect on the probable amount of hospital construction.

INTERSTATE CONTROL OF THE TUBERCULOSIS PROBLEM

By Hon. William Kent

Congressman from California

To my mind, there has been a great deal of misunderstanding about the passage of this bill. We are not indulging in charity work. We are trying to find a means of aiding the stamping out of tuberculosis. Tuberculosis is not a local question; it is an inter-State question. It is just as much an inter-State question as hog cholera or hoof and mouth disease, although the same methods cannot be used. Nobody but the doctors have a license to kill people that are infected with tuberculosis or other diseases. We cannot use the same drastic means to rid ourselves of this human ill. But we wish to do something to realize the federal responsibility toward establishing better standards of food and air and other sanitary conditions.

This bill as it now stands provides for a subsidy, or, if you prefer, a subvention, or if you prefer "pork," "graft," or anything else you want to call it, recognizing the fact that Uncle Sam's government is interested in this problem as a government, as a nation, and is looking towards the time when it can do more toward performing its plain duty. The bill, of course, on its face, provides for aid in caring for non-resident, indigent, tuberculous persons. I am not a doctor, but the medical authorities that I have been able to consult are largely of the opinion that, by the agitation that will come with this measure, people that are in the last stages, that are practically hopeless, and those who, on the other hand, can be cured at home, will be encouraged to stay home, and there will not be so much of the deluded idea that by going somewhere else they will become well. The matter of public education, to my mind, can best be carried out through the Public Health Service, cooperating with such an organization as we have here.

If we are to deny that this is not properly a federal matter, what are we to say of the expenditures made by the Agricultural Department in the last three congresses, looking toward the elimination of disastrous diseases of animals. There never has been a more noble victory than against hoof and mouth disease. In some countries in Europe hoof and mouth disease goes around and around just as hog cholera persists in this country. But the Agricultural Department through the aid of this "pork" subsidization, by providing half of the value of animals that were disposed of — that were slaughtered,— stamped this disease out.

As I started out by saying, we cannot kill off these tuberculous people, and we do not want to; the treatment for men must be different from

that accorded animals, although some objectors to the bill hint at practically similar methods. This bill looks toward the elimination of the disease, and especially the sources of infection, by education and better care. The Agricultural Department's expenditures in fighting hog cholera, hoof and mouth disease, and other animal diseases, have in the sixty-first, sixty-second, and sixty-third congresses, amounted to $15,289,614. That money was well spent. It was working toward cheaper animal food for all the people. The cost of a tuberculous person to the community, whether to his own family or through county relief or State relief, or private relief, is a tremendous charge. It is one that should be considered economically in the same category as the increased prices, due to animal diseases, of pork or beef needed for human food. In each case, there is an impoverishment of the people due to disease. In the same three congresses for the public health, looking toward another economic saving, there was expended for human beings $2,950,000, as against $15,289,000 in animal cases.

Now, this bill did not originate with me. Dr. Sawyer, the leader of our Health Department in California, Miss Tate, Dr. Philip King Brown, all of that State, and others cooperated in drafting the original bill. I had something to do with it. It was submitted to the Treasury Department and there considerably amended, and heartily endorsed by the Secretary, and then introduced into the House by me and into the Senate by Senator Norris, of Nebraska. There is no use discussing similar measures that have failed in the past, except that I am here to say that this bill is nearer going through than any measure that has preceded it. I believe that it will pass. If it does not pass this time, it will pass some other time. There is absolutely no possibility that this nation will refuse to recognize this question as a national question. We should be cleaning the cars in which tuberculous people travel in the same way as we clean the cars in which the cholera hogs travel. It is a national problem of first importance.

Now, to my mind, that it is the duty of the federal government to look after the non-resident inhabitants of the country, is perfectly plain. I do not know why the States should be forced to take upon themselves the burden of all indigent people, citizens of the United States or non-citizens who happen to load themselves on certain States, and yet they should be cared for. Certainly the federal government ought to bear its share. If our government had been started right, instead of having been started back end to, and the federal government had chartered the States, then we would never have had this up as a question. Such aid and attention would be a matter of course.

The gentleman who preceded me talked about the need of education. If he desires to ask for a large appropriation for investigation or for education, let him try it on; I'll help him all I can, but we could not get it. Whereas if we ask for direct aid to the end that the federal government take up its proper part of the responsibility, we have an argument that can be used, and it is not a selfish argument, either. I have had an enormous amount of correspondence concerning this bill, I suppose I am safe in

saying that there are in my office something like 1,200 letters from individual physicians. I had sent out a great many copies of the original bill, stating what was intended and a very small proportion of opposition replies came back. Some ingenious persons will always find some cause of objection and they dug up the religious question. Then they called the measure paternalistic. Then it was anti-States' rights, and undemocratic and unrepublican and unconstitutional, but never a similar word concerning expenditure for hog cholera. Then it was called "pork-barrel," and of course, there were questions as to whether this measure will increase the building of hospitals, whether it will increase or decrease migration, whether it will tend to standardize hospitals generally — these are the questions of great importance. I am not going into all these objections. I have a whole pocketful of them here. They will amuse you when Mr. Newton gets out his final report.

Now, as to standardizing treatment, a curious thing happened in that regard. I had the bad tact to put on my first bill "A Bill to provide federal aid in caring for indigent tuberculous people, and to standardize their treatment, and for other purposes." Well, you should hear the howls that came to me from people who did not believe there was any tuberculosis and therefore treatment for it did not need to be standardized or inspected, and from others who believe that by certain forms of massage tuberculosis can be overcome, and from many who thought this bill meant calomel and castor oil for every sufferer. There are numbers of letters of that sort. I have not the slightest doubt that this bill, if enacted into law, will tend to educate people and thereby standardize the treatment not only of the indigent, non-resident, but give better treatment to the resident, and that is a mighty important thing that has not been stated. Once we insist upon decent standards of food and air conditions among subsidized hospitals, other hospitals must come to that standard, so that not only the indigent in the subsidized hospitals, get the benefit of modern enlightenment, but all other patients get a benefit.

This bill is the way of least resistance; it is fair; and it can be made effective. It is so obviously the federal government's duty to look after this problem that there is no denial, but only carping criticism. I do not consider this bill by any means as final. If the federal government goes into this war it will tend, I am sure, to drive the States, State by State, into equal cooperation. I shall not be sorry to see the federal government make appropriations even larger than have ever been applied to hog cholera and hoof and mouth disease, and force local communities by example, because it cannot be done by law, into equal cooperation.

Now, I do not want to give any personal notes here, but in the whole question of local appropriation, I have always stood for the good faith of the locality being shown by its coming through with an amount equal to that which has been asked of the government. I believe that this policy, once started, will result in larger appropriations by the government and in larger local appropriations; and we will be getting somewhere toward doing something coherent and inter-State, toward solving this great inter-

State commerce problem, which under the welfare clause of the Constitution, and the Inter-State Commerce clause of that Constitution, has been shown over and over again to be part of our duty toward making this a better country to live in.

I know how easy it is to pick flaws in something somebody else is trying to do. I have not any pride of opinion about this matter. The bill originated with others; somebody else started it. It was strongly backed by an enlightened Secretary of the Treasury. I helped to draft it and push it along, and the Inter-State and Foreign Commerce Committee put in some amendments, not all of which do I approve. I happen to be the person who has had the hard work to do in an endeavor to secure some action by the government looking toward assuming its proper burden. That is my duty and I am going to do it.

Now, it is depressing to fight not only against the power of inertia, but to fight your own friends that are on the whole going in the same general direction, but who insist on going around the hedge and try to drag you with them; friends who are long on theory and utterly ignorant of the Congressional situation. It is easy to kill off constructive work, and it is awfully hard to enact it. I sincerely hope that you will be just and charitable toward this bill, which to my mind represents a first step and a possibility, and that you will do all you can to help pass it, because it means the beginning of recognition by the federal government of this disease as a national evil, as an inter-State commerce problem, and something that is Uncle Sam's business.

Now, I will quit, and let people who know something about tuberculosis take the floor.

INTERSTATE CONTROL OF TUBERCULOSIS

Will the Kent Bill Help?

By Gertrude Vaile

Denver

It is a very great pleasure that this question of Interstate Control of Tuberculosis which has been so hopeless and distressing a problem for many years is receiving consideration from national conference gatherings and from the United States Government itself. Such studies as the Public Health Service has been making these last two years through Doctor Sweet, Doctor Lanza, Doctor Carrington and others have made us all feel that the light is breaking at last. Certainly Government help is sorely needed. But would the form of help which is now being proposed by the Bill which Mr. Kent has introduced in Congress give real help?

The purpose of the Bill is indeed clear and fine. More and better sanatorium care is needed for the relief of patients and the protection of communities. One must be unfeeling indeed not to appreciate this effort to secure it. But the method proposed seems to some of us at variance with the fundamental principles for which we are all working, and inevitably bound to make the problem as a whole more difficult. I believe this will be the result because I believe that such a law would have the effect, first, to increase the migration of tuberculous people; and second, to make them lose their legal residence in their home places and establish it in climatic resorts away from all their natural helpers while unable to attain real power of independence. If these positions are well taken then must the Bill greatly increase the sufferings of the patients and make any real control of the tuberculosis situation more impossible than ever.

Let me give you some facts regarding the extent of the problem as it now exists in Denver. First please note that the population of the entire State of Colorado is about one-sixth of the population of New York City. In the entire State of Colorado there are only about 183,000 taxpayers; 55,000 in Denver. Please keep that back ground in mind when interpreting our figures. In 1915 the Denver Public Relief Office dealt with 324 cases in which tuberculosis was involved. The term "case" as here used means the family group whether one individual or ten. These 324 relief cases included 685 individuals. They represent 16 per cent. of the total number of home relief cases and 21 per cent. of the total relief given.

What proportion of tuberculosis in Colorado may actually have been acquired there it is impossible to get at with accuracy. But a glance at

the birth places of our tuberculous people is somewhat significant. Of our 324 cases there were five in which nothing was recorded about the place of birth. Of the other 319 not one was born in the State of Colorado. The County Hospital reports for 1915 show 273 tuberculosis patients of which only four were born in Colorado and two are unrecorded.

Now in regard to my first contention that this Bill would increase migration, it appears to me that logically it must inevitably increase it. Whatever advantage there is in the Bill comes to the patient only as he becomes homeless. I can find no incentive in the Bill to keep him at home but a bonus if he goes away. However, I have discovered in this discussion that what seems logic to one person does not seem logic to another, so let us lay those considerations aside for the moment as matters of personal opinion.

I would call your attention to the clause in the Bill that is intended to provide a safeguard against stimulating migration. The people may not receive the benefits of the Act if they leave their legal residence *in order to receive* them. But who shall say what purpose may have been in the patient's mind? It could never be proved or disproved. Climate alone has long proved reason enough for leaving home. Any further question could only lead to perjury and dissimulation on the part of the sick man struggling for his life. That this limiting clause is in the Bill at all is interesting as clear evidence that the framers themselves admitted that the law might stimulate migration unless safeguarded, but the safeguard provided is of the stuff that dreams are made of. Man at best but looketh on the outward appearance, it takes the Lord Himself to look upon the heart.

If my opinion that the Bill would increase migration is mere opinion, it is at least sustained by a volume of testimony from people who are peculiarly in a position to have wise judgment on such subjects.

Mr. F. J. Bruno, formerly of the Colorado Springs Associated Charities, now General Secretary of the Minneapolis Charities writes:

"Personally I have no doubt that it would increase migration. I cannot see how any one living in a Western State could have any doubt."

Miss Anna E. Watson of the Associated Charities of Pueblo, Miss Eddy of the Associated Charities of Fort Collins and Mrs. Cheeseman of Greeley, Colorado, write emphatically to the same effect. The representatives of the Denver Federated Charities feel as strongly as I do. There are no other cities in Colorado that have organized charities.

Mrs. Gilchrist of Phoenix, Miss Bethell of San José, Mrs. Brookes of San Barbara, Mr. Gwin of El Paso, are all of them strongly of the opinion that the effect would be to increase the migration of tuberculous people. Mr. Rawlings of Forth Worth declares that the Bill is dangerous, and, though he does not specify in what respect, the inference is clear when he goes on to say that some way should be found to insure States taking care of their own.

Not only do the Charities people of the Southwest hold this opinion

but strong charity organization people the country over think likewise. Mr. Magruder of the Baltimore Charities writes that he has discussed the question with several of his associates and says,

"All confirm my own opinion that the effect of the Kent bill for Federal Subsidy will be to increase the migration of tuberculous people away from their homes to climatic resorts. How can it be otherwise? All our Charity Organization Society experience certainly goes to prove it."

Mr. Almy of Buffalo writes:

"I believe emphatically that the Kent Bill will increase the migration of the tuberculous and cause more tuberculosis dependency than before."

Mr. Fred R. Johnson of Boston writes:

"It seems to me inevitable that the passage of such a measure would increase the migration of tuberculous people."

Mr. Joseph C. Logan of Atlanta thinks the same and says:

"I believe the Bill will give widespread currency to the idea that the United States Government has made provision for non-resident tuberculous patients."

Mr. Persons of New York writes:

"It seems to me so obvious as scarcely to warrant discussion that the Federal Bill for the subsidy of non-resident tuberculous patients will increase the migration of such patients."

I must not take time to continue quotations, but this is the opinion of almost all the Charity Organization Society people from whom I have had time to hear. Mr. McLean, Secretary of the American Association of Societies for Organizing Charity, calls it "a barbarous proposition" and sends me a telegram this morning following the annual meeting of that Association in Indianapolis yesterday:

"American Association unanimously and enthusiastically approved resolutions regarding Kent Bill."

I must not take time to read the resolutions but they set forth among other things that:

"It is a well established principle of humane and successful care that the patient should be treated near his home and friends;" and that

"In the judgment of this Association such legislation will increase inevitably ill advised migration of such dependents often in the late and hopeless stage of their disease; and will encourage migration of their children and other dependent relatives."

At least if what looks like logic to me in this matter is mere personal opinion it is pretty well supported by people who have long been struggling with the problem of non-resident dependency and the forces which increase and diminish such problems.

But even if all this weight of opinion were opposed to my own, instead of so strongly reinforcing it, I should be still unshaken in my conviction on account of the Denver experience. In Denver we have faced conditions more like those which this Bill would create, than can be found anywhere else.

We have in Denver two National Jewish tuberculosis sanatoria, the National Jewish Hospital for Consumptives and the Jewish Consumptive Relief Society Sanatorium, both supported by Jewish contributions from the entire country, both open to destitute Jews from the entire country. What is the result of this situation in Denver? The Jewish Social Service Federation which deals with needy families in their homes finds that about 90 per cent. of all their home relief work is in cases of tuberculosis against the 16 per cent. from the Public Relief Office, which is to say, the general community. Our entire ghetto is a tuberculosis colony.

Why so much more migration of destitute tuberculous Jews than of other tuberculous people? Personally I can find but one possible answer — the existence in Denver of the two National Hospitals. This answer and the efforts of the Jewish Social Service Federation to place back the responsibility for each case, case by case, according to the rules of the National Jewish Conference, upon the community from which the people came, has resulted in such exceedingly strained relations between the Hospitals and the Local Jewish Charities that finally all sides have united to call for a survey of the situation. Whatever solution of the difficulty the Jewish people may choose to try out, they are a united, self-conscious, socially-conscious group. They may make their own rules and they can apportion the responsibility equitably among themselves.

For the rest of us it appears to me that Federal Legislation, such as that contemplated in the Kent Bill, would bring down upon the climatic resorts a problem like the Denver Jewish problem, but on the universal scale of the whole American public when no machinery yet exists to meet it or adjust responsibilities, and when it has baffled the finest machinery that a united, socially conscious people, has yet devised.

Denver also furnishes abundant illustration of my second point, that the proposed Bill would tend to make tuberculous people lose residence in their home State and establish it in the place to which they go for their health, though unable to adapt themselves independently to the new conditions.

Statistics regarding the resident and non-resident tuberculosis problem in Denver are difficult to secure, partly by reason of the peculiar organization of our charities. The Federated Charities deals with all non-resident families and some resident families. The public charities deal with all homeless men and with resident families. Full and uniform statistics from the two offices would be necessary to get at the real extent of the non-resident problem or the significance of the resident problem as growing out of the non-resident.

The Federated Charities report shows 209 families having tuberculosis dealt with during the last fiscal year. I am told that most of those are non-resident, but exact details about them are not available. The cases dealt with by the Federated Charities and the Public Charities here recorded are, I think, in no instance duplicated. Of the 324 cases of the Public Department, 134 or 41 per cent. had been in Denver less than

one year. Those would all be homeless men,— either single or married but not having their families with them. Certainly these homeless men would be the most restless group of any, the least likely to stay, but 11 per cent. of those non-residents established legal residence during the year. There is no sanatorium in Denver which does a sufficiently extensive follow-up work to be able to give exact statistics as to where their ex-patients go, but the Jewish Consumptive Relief Society estimates that 50 to 60 per cent. of their discharged patients remain in Colorado. How many of those are able to maintain a real independence, there are no statistics to show, but that sanatorium takes patients in any stage of disease and a large proportion are incapable of returning to any real economic efficiency.

The study of the situation that really needs to be made in Denver, but which it was not humanly possible for me to make exhaustively at this time, is a study not of the non-resident cases but of those who attain residence. Practically all of them came for their health and with dependency imminent, although a little money saved, a little earning capacity, help from home perhaps for a time, may have carried them over for a year, or two, or three, before the breakdown and the final dependence. Very many, to my knowledge, who are now long established residents have been more or less dependent from their first year.

I picked out the 25 heaviest cases of tuberculosis relief during the past year. They were all old residents who had been in Denver more than three years and from that to 30. Old records are so inadequate or unavailable that I was unable to trace early histories of dependency which I am sure existed but I did learn that at least 16 of those 25 families received charitable aid within the first three years. Most of them have been more or less dependent upon public or private charity through long terms of years.

How many widows of tuberculous men we helped last year I do not know, but we dealt with 24 families of widows in which tuberculosis now exists and with 107 cases of tuberculosis in married couples, most of whom will sooner or later be transferred from the married to the widowed group. These constituted 41 per cent. of all our tuberculous dependents helped from the general relief fund. There are also the widows who are drawing mothers' pensions. The Mothers' Pension Plan is just in its beginning and must be considered with the prophetic spirit. We have at present 30 pensioned mothers in Denver. In ten cases tuberculosis has been a factor. These ten mothers, one-third of the total, have a little less than one-third of the total number of children and a little more than one-third of the pension fund. These cases if not yet significant for their numbers are yet startlingly significant for principles involved in the individual cases which are precedents showing what may be expected on a larger and larger scale. We have just pensioned for example at $35 a month a family who have now been in Denver eight years but whose dependency was known and their coming protested within a few days of their arrival.

If Colorado climate were really necessary for the life and health of these people who come it would be different. We should just have to do the best we could and feel that if the people suffered and the problem grew by reason of our inadequacy it just had to be so. But you doctors have taught us that exceptional climate is not necessary, that climate is good when it can be added unto various other good things, but that other things are more necessary and with those provided the patient may be cured in almost any climate. As one of our Tuberculosis Dispensary doctors wrote on a diagnosis blank which he returned to us in response to our query whether we might properly send a patient back East, "Will do best where economic condition is best." The tragedy of the people who come and think they have to stay when they would be very much better and happier at home is beyond expression.

We have no power to send home a patient against his will even when it would clearly be for his own good. Our only power lies in persuasion. A law like the one proposed gives an incentive to remain and receive sanatorium care which sweeps away all power of persuasion.

I well remember one case in which a young man had become dependent within seven days after arrival and was sent to the County hospital. We corresponded with his home State and made arrangements for his care there. The doctor advised him that he would be very much better cared for there. The ticket was ordered, the hour set for departure, the patient willing to go, and just at that point he secured admission to the tent colony on the edge of town and all other plans were thrown to the winds. He is still at the tent colony, not so well as when he came, now in the third stage. In a few weeks more he will have established residence. His wife and child in the East are impatient to join him. Over and over have all of us who are working in any of the charitable agencies in Denver seen that same thing happen. The very night before I left home one of the Tuberculosis Dispensary doctors was telling me of two other cases of much the same sort. If our tent colony (a very kind effort of private charity but utterly inadequate from a sanatorium point of view) can hold people in Denver in spite of doctors' advice and better arrangements for their care at home, what can we expect when the government itself will help them to receive the best of carefully supervised care in Denver.

And if a patient has been away from his own home for a day more than a year, it is customary for the former place of residence to refuse all further responsibility for him. There was that young man who had lived in one of our central cities from his childhood up; almost all of his relatives lived in that city. When he was stricken with tuberculosis, he came out to Colorado, wandered from place to place trying to get work, but too sick to work. He finally arrived in Denver and at our office, and was sent at once to the County Hospital. According to his report, he had been gone from his old home almost but not quite a year. We submitted the facts to the county agent in that city stating that if they were true we would return the young man, who was exceedingly

anxious to go home. The county agent replied that he found that the young man left the city *a week* earlier than he said and had lost his legal residence. Now, he had worked in that city every normal working day of his life, every association that he had was there, if he had any legal claim on any place in the world, it was there, but we had to prove to that county agent that the young man left on the day that he thought he did and not the week earlier, or he would have no right to go home and though he had no claim whatever on Denver, if we sent him home he would simply be returned, poor shuttle-cock, to us.

And again, a man came from the Atlantic Seaboard to the National Jewish Hospital. He was there for a year and a half, except a short period out of the hospital about the middle of the time, on charity the entire time he was in the sanatorium. Upon his discharge he was returned to his home city where his wife and family had been all the time. Six weeks later he decided that the climate in Colorado where he had improved in health was better for him, and the public authorities sent him and his family to Denver. When I protested they replied, "But the man had lived a year and a half in Denver and had only been back here six weeks."

There was another case — a clerk who came to Denver from a city on the Atlantic Coast with very fair prospects of recovery. He had a position open to him with a Denver branch of his home firm as soon as he might be able to take it, but he was far too sick to work, and reached us within a few days of arrival. We wished that we might give the young man the best possible chance of recovery, and hoping to establish a helpful precedent I wrote asking the Attorney General of his home State this question: "If a citizen of the State of X is cared for as a charity patient in a tuberculosis sanatorium outside of the State of X will that necessarily affect his legal residence and consequently his claim for further care in his home State?" I cited the case in question and asked whether, if this young man should file an affidavit with the Public Charities of Denver and with the official charities of his own home, setting forth that he was only a sojourner in Colorado for his health and regarded X as his home, whether under these circumstances he would have power to retain his claim upon his own place and return there for further care if need be. The Attorney General referred my letter to the State Board of Charities and replied: "It is the opinion of the Administrative Department concerned that the patient referred to should not be deported to this State." So that was what we got back when we offered out of the benevolence of the Denver community to take care of their recognized citizen for a year or more without expense to them.

There is one section in this Bill which has been thought to offset this effect of establishing helpless people in the climatic resorts and to have the effect of placing the responsibility upon the States where they belong. In section 3, it is provided that the government may grant transportation to return a non-resident to his place of legal residence upon two

conditions — that the patient himself desires to go and that proper sanatoria and care shall be provided in his place of legal residence. A person who has once had such transportation may not again receive transportation from the government, but there is nothing to prevent his again receiving sanatorium care with government help if he again becomes non-resident.

It appears to me that that section does not help but rather intensifies those troubles already intimated. Am I not right in my understanding that it is characteristic of tuberculous people to be both obstinate and restless? This section seems to me to play directly into both those irresponsible mental peculiarities. The patient may be sent home only by his own desire. But why should be desire to go? The finest of climate and government approved care are his if he stays away. The law offers no advantage to him to go. The only influence to that end is homesickness and the natural restlessness of his disease. Why should not the patient go wherever he thinks the climate is best without any need of forethought, believing that if he does not like it he can just go home again at government expense. And when he gets home, unless his disease is so far advanced that he has practically given up hope, he is likely to think (like the man already cited) that after all it was unwise to come back, and the same reasons that started him off in the first place will start him off again, more appreciative than ever of the advantages of government help, more than ever confirmed in his restless wanderings.

As for the attitude of the home State in all this, there is always a long waiting list for their sanatoria. If the patient is already being cared for somewhere else without expense to the State, why hurry to take him in? It is expressly stated that the government will help to take care of him if he stays away and will do nothing if he goes home. It appears to me that far from helping States to assume their responsibility for their own citizens this has the effect to penalize them if they face it.

Since then it seems to me clearly demonstrated that this Bill would have the tendency to increase the migration of sick people and to leave them helpless in the new community, and I can find nothing substantial in the bill to offset that tendency, I can only feel that the proposed law is opposed to the fundamental principles of anti-tuberculosis work and the humane consideration of the welfare of the patient.

It is a terrible thing to be sick away from home, away from all familiar associations, family and friends, even when one can command everything that makes for comfort. How much worse when one is destitute and driven by anxious necessity. Moreover the tuberculous person in the climatic resort is an object of fear and dislike. It is hard for him to find so much as a boarding place even when he is able to pay for it. It is extremely difficult for him to find work that he can do, and he is feared by his associates so that he is not acceptable in positions that he would be able to fill.

If my argument has been sound that the migration would be increased then must the suffering of tuberculous people be enormously increased

even if the problem of funds for charitable relief were not involved at all. I fully admit the argument that Colorado has received rich benefits from its tuberculous citizens and does owe a debt of care in return to helpless tuberculous people. And truly I think we are trying to pay it. More than one-fifth of our home relief fund and one-third of our widow's pension fund for this wholly imposed burden is not small, and the generosity of the benevolent individuals has been endless. We ought to do what we can, but if in the end we cannot meet the need adequately then must any increase of the problem be a heart-breaking nightmare to the people who must deal with it, and increase the woe of the sick.

There are two things that I do believe can be done to help to secure an interstate control of tuberculosis. One is active effort on the part of the federal government in the way of investigation, experimentation and education. It seems to me that can be carried on very much better without the subsidy than with it. With the subsidy, what the government *does* would speak so loud that we could not hear what it *says*. It would say, "Stay at home, it will be better for you unless you have abundant independent means." And then it would hold up fine government supervised sanatoria available only to the destitute who go away from home. Government help is direfully needed but it needs to present a clear cut message and not be confused like that. If it is to give financial help in the care of individuals at all, it should at least make the advantage to those who stay at home and not to those who go away.

Investigation and experimentation need not be a merely passive matter but may be a very active and positive service. The wonderful gift of $100,000.00 just given by The Metropolitan Life Insurance Company to The National Association for the Study and Prevention of Tuberculosis to try out an experiment to eliminate tuberculosis absolutely from some selected community is a positively thrilling suggestion of what the United States Government could do. Such efforts on the part of the Government would point the way for all communities to take care of their own people and inspire them to do it. Through such help and leadership, we could hope to eliminate tuberculosis even as the medieval plague.

The other way in which interstate control can be helped is through legislation either federal or uniform within the States to fix responsibility for interstate dependence. There can not be any true interstate control of this problem until there is clear interstate responsibility. I cannot believe that federal legislation to secure such justice between States is unconstitutional, but if it is, then must we earnestly seek it through uniform State laws of settlement. Laws of settlement, understand, determine the conditions under which a person is legally eligible for public aid. None of the Western States, I think, have any such laws and those that exist in other States are absurdly variable so that the unfortunate dependent falls between.

The needed law should properly, I believe, take the position which the United States Government has considered reasonable between na-

tions, namely, that if a person falls dependent within three years after arrival in the new community from a cause which clearly existed before he came, he may be deported to the place from which he came. But with such a section should be coupled in the interest of humanity another section giving to States the power to pay for the maintenance of their own people outside of their own borders if it is expedient to do so. Many times, when I have written to the place of the patient's legal residence, I have been told that they would give full care if the patient was returned, but that they had no power to pay for his care outside of the State. We have had several instances where public officials have paid for the care of their people in Denver but whether they were empowered by law to do so or were law unto themselves and simply acted in accordance with common sense and humanity I do not know. Certainly the law should specifically authorize such action. And another section of this needed law should make it clear that a dependent remains a proper charge upon the place where he last had legal settlement until he acquires settlement elsewhere.

In conclusion the Denver experience has convinced me beyond the possibility of doubt that any plan which offers government care, *in whole or in part,* to destitute tuberculous people who are not legally residents of the place where such care is provided, must of necessity increase the migration of such patients and their families to climatic resorts and settle them away from all their natural helpers in communities unable to meet their needs from either the industrial or the charitable standpoint. And so I can only come back to the resolutions of the American Association of Societies for Organizing Charity:

"Be it therefore resolved, that we earnestly oppose the enactment of the Kent Bill because it would certainly increase the amount of lonely and neglected misery; and be it further

"Resolved, that we favor the investigation by Federal Authorities of means for the prompt and efficient care and control of migratory tuberculous patients without lessening the responsibility of States and communities for adequate care of their own sick."

THE SOLUTION OF THE INTERSTATE TUBERCULOSIS PROBLEM

By Wilbur A. Sawyer, M.D.

Sacramento

The interstate tuberculosis problem has reached such proportions that its solution would have a pronounced effect in reducing the prevalence of tuberculosis throughout the United States. The studies of the interstate migration of tuberculous persons made for the United States Public Health Service by Sweet,[1] Carrington,[2] Foster,[3] and Lanza,[4] give an idea of the colossal size of the problem and furnish sufficient data for planning a start in control measures. No plan should be considered which has not for its first aim the reduction of the total amount of tuberculosis in the nation, and as secondary purposes the cure or relief of the invalids and the fair distribution of the burden of their care.

Of these various objects, the equitable distribution of the burden of the care of the migratory tuberculous is the least important. The interstate tuberculosis problem is far more than one of charitable relief. It is discouraging to find how many charity workers and even active members of tuberculosis associations would be satisfied by a solution on the basis of enforced transportation of the tuberculous in both directions across State lines. Some of these people show more interest in inflicting the care of the patient on the State from which he migrated than in the needs of the patient or the effect of this method on the national problem. The problem is not one of mere charitable relief, to be solved through disorganized "passing on," nor even through more systematic exchange of burdens by unofficial charitable organizations.

The problem is big enough to deserve the attention of the States and the nation through the proper trained officials. In his presidential address before The National Association for the Study and Prevention of Tuberculosis in 1912, Ravenel,[5] said, "Why is it that we must depend upon an organization of private citizens to lead a campaign for the prevention of tuberculosis? It is a public health matter of the highest importance, and our leaders should be those intrusted with the health of communities and States." In the same meeting Probst[6] made a plea for the official control of tuberculosis and said, "For the eradication of tuberculosis we need the active support of national, State, and municipal governments; and it would seem to me wise that they should be in official control in the sense of directing, systematizing, and coordinating work for its prevention. Its final eradication should be a governmental problem to be worked out by the government along all possible lines." These statements apply to no part of the tuberculosis problem more than to its interstate phases. There we

need, at once, the efficiency that can be secured through official organization and discipline and power.

The interstate migration of tuberculous individuals is essentially a national question, since it deals with the relations of one State to another. Moreover, it is recognized as such in the United States Interstate Quarantine Regulations,[7] which prescribe certain precautions which must be observed by common carriers transporting persons known to be tuberculous. Since it is a national problem, the federal government should take the lead in its solution. The necessary authority and money should be given to the Public Health Service to enable it to take this question in hand in that way which will have the greatest possible beneficial effect on the general tuberculosis situation.

In dealing with the problem little would be gained by attempts to prevent the tuberculous from crossing State lines. In Section 22 of the Inter-State Quarantine Regulations, just referred to, the tuberculous are exempted even from some of the restrictions imposed on persons infected with the more acute communicable diseases. The reasons for this are obvious. The enormous numbers of tuberculous persons who travel throughout the country under conditions which render them comparatively safe would make any rigid exclusion of tuberculous travelers from all States, or any State, undesirable even if it were practicable to examine and restrain them. To stop at the State borders all whose tuberculosis had passed a certain stage, or all whose pocketbooks were below a certain size, would likewise be futile and brutal and entirely undesirable. To leave it to the individual State to exclude or deport its non-resident tuberculous persons by agreement or by stealth leads to unfairness and misunderstanding. As a member of the California Lunacy Commission I appreciate fully the difficulty and expense involved in returning the insane to their home States and persuading the officials there to receive them. But this is much more practicable than the exchange of the tuberculous. As executive officer of the California State Board of Health I have discovered the utter impossibility of compelling a State to take back a leper, even when responsibility for his case was admitted and the only plea was that his home community had no facilities for caring for him. Some tuberculous patients are willing to go home and others are not. To extradite a criminal is easy compared to the difficulty of taking the legal steps necessary to return an indigent sick person against his will to the State in which he has a legal residence.

A difficulty which would arise frequently in connection with the return of the tuberculous would be the trouble in establishing the fact of their legal residences anywhere to the satisfaction of the States to which they are to be returned. Many of the tuberculous are incessant wanderers. They travel from State to State as soon as the disease has reduced their efficiency and made it difficult for them to hold a position. As the disease progresses they try one method of treatment after another and sooner or later many of them seek desperately a more kindly climate, hoping to find a magic cure. When they have reached a so-called resort State they are apt

still to migrate from town to town, and county to county, always hoping, until some county hospital gives them a bed in which to meet their end.

These people need rest and they get travel. They need food and they get hardship. They need supervision and they get neglect. When they come to State institutions they are refused admission because they are not residents of the State. When they reach city or county hospitals, they are admitted only because they are so far advanced that they cannot be refused. And this is going on all over the country. Our unwillingness to recognize the national responsibility for the most strictly national aspect of the tuberculosis problem, is resulting in needless suffering and widespread infection.

To some people it seems wise to deal with this interstate tuberculosis problem through study and education alone. They are afraid to begin active control measures for fear of mistake. A few years more of surveys and reports, and they will consent to a start. In the meantime, the thousands must be infected by the unsupervised, indigent, migratory tuberculous, and the hordes of wanderers must suffer and die as the result of this ultra-conservatism. Action is not incompatible with study. The best wisdom is gained through experience. We know enough now to lay the foundation for the solution of this problem and can begin effective administrative control by using the government and State officials who devote their entire time and best thought to disease prevention.

What, then, would be the essentials of a plan which would at the same time permit an immediate beginning in the control of the interstate tuberculosis problem and have the greatest possible beneficial effect on the national tuberculosis problem?

The United States Public Health Service should be authorized, by Act of Congress, to take the lead in this control, and should be given the funds necessary for the work, both of investigation and administration. No right which a State now possesses, to return non-resident cases, or to care for them according to its own plans, should be taken away. It should be left to the option of the States whether or not they will ask and accept the assistance of the government. A plan which secures efficiency through uniformity and organization will soon produce results which will speak aloud. In each State, the public will then demand that they be given the increased protection, which government aid would insure. In the meantime, any State that desires to do so, should be allowed to contribute to the solution of the problem by experimenting along independent lines under its existing rights. Independent charitable relief, education, and investigation need in no way conflict with the larger plan.

The United States Public Health Service should be authorized to transport indigent tuberculous persons to their home States under certain conditions. On receiving the application of the patient, the Service should be permitted to investigate and to assist in making arrangements for institutional treatment in the State where the patient has his legal residence. If such arrangements can be made, and if the necessary travel will not injure the invalid, and under no other circumstances, the gov-

ernment should send him home and bear the expense of transportation.

This procedure would improve the national tuberculosis situation because a source of infection would be eliminated by the removal of a person from a place where he was neglected, to an institution in which he would be so cared for that there would be no exposure of susceptible persons, and especially of children. The present unofficial method of removing a person from one place of neglect to another may mean that people in one State will be infected instead of those in another. The total amount of tuberculosis in the nation is unaltered by this visionless system of exchange.

Where the return of the patient cannot be brought about under favorable conditions, provision should nevertheless be made for institutional care. The United States Public Health Service should be authorized to pay at least half the cost of caring for these indigent, non-resident cases in suitable public hospitals. When the State and local authorities show an appreciation of the importance of hospital care for all cases of open tuberculosis, there should be no trouble in placing nearly all non-resident cases in hospitals in one or other of two ways — either through return at the expense of the government, or through admission to local hospitals receiving the federal subsidy. Very soon, wherever there was a healthy public sentiment on the subject of tuberculosis, the public hospitals would be compelled to accept any neglected, non-resident cases which could not be sent home under favorable circumstances. The public would demand it for the sake of humanity as well as for self-protection.

Many States and counties are to-day spending considerable money in the care of the resident tuberculous, but are, at the same time, allowing the non-resident tuberculous to drift about uncared for or to be railroaded, unofficially, into other States where they will be equally uncared for and dangerous. The tubercle bacilli discharged by the non-resident tuberculous indigent are just as virulent as those spread by the native, and they all help to keep up the high tuberculosis death rate.

More beds for advanced cases mean fewer infections. The federal subsidy would increase the number of beds and would enable many communities, which are now overwhelmed by their non-resident problem, to start institutions and begin active control. Federal aid in caring for those non-resident patients who now compel attention because they are so far advanced that they must be cared for would permit the addition of more beds for the resident tuberculous. This would shorten the waiting lists, and permit the admission of cases at earlier stages of the disease.

Unconditional payment of a federal subsidy for the care of non-resident indigent tuberculous persons would not give the greatest possible results in the control of the general tuberculosis problem in America. The measures advocated are not intended as charitable relief for States any more than for individuals. In so far as the burdens of States are equalized and made more fair, and as individuals are cured or made comfortable through the action of the law, we shall rejoice in the desirable result. But the measure of success of the control must be the reduction in the

general death rate from tuberculosis. The federal subsidy should, therefore, be paid under such conditions that the nation will get for its investment the greatest possible return in tuberculosis prevention.

To this end, all public institutions applying through the State for the subsidy must, as a condition of receiving aid, reach standards of equipment, diet, and care to be set by the United States Public Health Service. Officers of the Service would visit and pass upon hospitals at suitable times, just as they now visit licensed laboratories where biological products are manufactured for interstate commerce, and just as some of the States inspect county tuberculosis hospitals which have applied for the State tuberculosis subsidy.

The benefits derived from the establishment of minimum standards for a large number of public hospitals scattered throughout the entire country would be far-reaching. As non-resident and resident cases are usually cared for in the same institutions, both would benefit from the improved care.

In the management of hospitals economy is all too likely to lead to curtailing of diet, inadequacy of equipment, lack of cleanliness, and insufficient supervision by nurses and physicians. Minimum government standards would give the people a measure, by which to judge their public hospitals, more accurate than the testimony of the hospital superintendents or the complaint or praise of patients. As a rule, the public would insist that the hospital should qualify for the federal subsidy by furnishing at least the care prescribed by the standards set by the United States Public Health Service. This is not mere theory. Our experience with State tuberculosis subsidies has shown that there is intense public interest in county tuberculosis hospitals and that supervisors will, if necessary, spend more than the amount of the subsidy to meet State requirements and thereby win the approbation of the people. The same situation would arise in connection with the federal subsidy, but it would arise in the whole country, instead of in only a few States.

Another function of the Public Health Service, under the proposed legislation, would be, with their usual thoroughness, to collect, formulate, and distribute for general use information and descriptive matter relating to construction, equipment, and maintenance of tuberculosis institutions. There would be unusual opportunity for study of the benefits to be derived from various diets, the ideal methods of management, and the amount of supervision of patients that is necessary. All these factors would necessarily be studied in relation to costs, in order to reduce waste and make it possible for State and nation to do the most good for the money expended. The resulting information, together with the knowledge gained in connection with the administration of the law, and the carrying out of special investigations, would be invaluable.

Under such a system we would have fewer monuments to extravagance. There would be less spent in pretentious architecture and unnecessarily expensive building materials. There would be more beds and shorter waiting lists. The patients would get the benefit of better diet and more

supervision. The nation would look forward to a more rapid reduction of the tuberculosis death rate.

The administration of the law would necessarily bring to light invaluable data regarding the epidemiology and control of tuberculosis. Very little of this information is being obtained by studies of the undisturbed problem. The introduction of any single definite new factor, like the intervention of the government, would reveal some of the laws and principles — psychological, pathological, and economic — which underlie our interstate tuberculosis problem and the national tuberculosis problem.

One reason so many people are timid about doing anything to improve the outlook of the tuberculous wanderer, stranded away from home, is the natural fear that any action which would relieve his present neglect would encourage increasing numbers to migrate and would but aggravate the interstate problem. Rather than take any chance with such a possibility, the objectors would go on doing nothing more than telling to the few the disadvantages of migration and applying palliative measures to the local problem instead of corrective measures to the general one.

Those who migrate on account of tuberculosis do so largely on their own initiative. They have heard of wonderful cures; have perhaps known persons who recovered after change of climate. Those who died were not present to testify. Many who migrate may even have heard that they should not migrate without sufficient money to insure proper care. But they find that they are going down hill, and that suitable care in a public institution is not available at home. They take what seems to them their one chance, and travel. They do not find what they were looking for, and move again. So they go on until the end. Probably no official action will suddenly and decisively change the volume of this migration, but such change as is made by involving the government in the control of the interstate tuberculosis problem would, it is my firm conviction, tend to diminish migration.

The reasons are several. In the first place, the present fight against migration consists in warning the poor tuberculous — and that includes most of them sooner or later — not to migrate. What the invalid wants to know is what to do, rather than what not to do. He must do something or die, and he does something, and perhaps dies all the more quickly.

The investigations of the United States Public Health Service, under the proposed legislation, would demonstrate to what extent the lure of distant climates is being supplemented by the drive of public neglect at home. The Service would be in a position to advise through publicity and correspondence, the best course for any indigent tuberculous individual to pursue in order to get needed care in a public institution. Very recently a man migrated to California from Chicago, looking for a climatic cure for tuberculosis. When questioned he stated that he had never heard of the Chicago Municipal Sanitarium, and was not aware that he could receive treatment at home. We need to invite people to get the needed care at home, and they will be less likely to overlook the invi-

tation if the government is advertising it and also warning against futile travel.

The migration would be gradually diminished by the proposed legislation because many non-resident tuberculous patients would be referred to the Public Health Service for consideration instead of being passed along into the next State. Some of these people would be returned and placed in local hospitals. This would call local public attention to the existence of the local hospital and to the advantage of institutional care in almost any climate over neglect in the sunniest region.

The methods of the government should stimulate the States to increase their institutions until they are adequate for the public need. The Public Health Service would soon have complete data on this subject, and their publication would tend to induce each State to provide for its own. This effect, although gradual at first, would be towards a reduction of the migration. The stimulus of publicity will not fail to call attention, in more definite terms than are now available, to the need for more public tuberculosis hospitals, and will further the present movement to provide more institutional care for the tuberculous.

All of the principles I have advocated here have been embodied in the Kent Bill (H.R. 11864), which is now before the United States Congress. May the bill become a law! If it does, the nation will have another method of effective attack on the great tuberculosis problem, and we can hope to enter at once on an era of more rapid advance.

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DISCUSSION ON PAPERS BY MR. FOLKS, CONGRESSMAN KENT, MISS VAILE, AND DR. SAWYER

Dr. Richard C. Cabot, Boston: Mr. Kent makes a very powerful appeal when he asks me to get in and help a good cause. I feel the power

of that appeal; I feel, have often felt, as he does, what an awful bore it is when cranky reformers cannot agree among themselves, cannot get together on what is good. But there is one thing I think we would all agree on: if this bill is going to increase tuberculosis, then Mr. Kent would want it just as little as any one else. The whole question is, what does the bill do? One other thing it seems to me, on which we can all agree, is that the point of view that this is a matter of health and not of charity is fundamentally opposed to the principle of this National Association, which is that tuberculosis is both a problem of health and charity in the vast majority of cases. Surely we are not going at this time of the day to try and separate health and charity which have been brought together through the activity of this Society.

Now, I think so far we can absolutely all of us agree upon that. The whole question is, what are to be the effects of the bill? Some months ago I wrote Mr. Kent a letter stating that I approved of this bill and was glad it was going forward. I, therefore, started with a strong feeling in its favor. I had not at that time considered, and I do not think most of those who have favored this bill thoroughly considered, the argument against the bill.

With your permission I will go over the points which seem to me to summarize what has been said on both sides. In the first place, those who advocate this bill feel the vital importance of better care of tuberculosis in each State, because of what the United States can do. Now, we all of us want that. There is no difference of opinion there, and the question is, can we get it? Those who proposed the bill say the United States government will help to check up the standards of the old sanatoria and will help the building of new, and that in this way the infectious advanced cases will be kept in isolation and new cases will not occur. Then those who support this bill say that the migration of the tuberculous, so far from being increased, as Miss Vaile thinks, would be decreased. There is a very important question of fact. Will it be decreased because of the advertisement which the national government can give to the fact that climate is no cure for tuberculosis, and that people had much better stay where they are? I think that against this you have to consider Miss Vaile's aphorism:—"What the government does may speak as loud as what it says." The United States can thus, and only thus be brought into this tuberculosis problem. We cannot get the United States to interfere with any State. It can get into the field of tuberculosis work only through the interstate problems and here is the only obvious interstate problem concerning tuberculosis; it is said, and said, I think, plausibly, this problem is too big to be solved unless the United States comes into it. The question is, can it be solved even then?

Then it is also said that as a part of this educational propaganda, the United States can spread widely and effectively knowledge about tuberculosis, just as it has recently spread knowledge about the plague. All of those results are certainly desirable. There is not a person in this hall that does not desire them. The question is how far they can be attained.

Let us consider the other side of the question. What will happen to the "health States"? That is the fatal question. What will happen there?

It is said that an unjust and disastrous increase of the burden of certain health States, such as California and Colorado, will come about because of the increased migration of indigent tuberculous patients and their families.

No one knows how many of them are married. The only figures that I know of on a large scale are those presented by Miss Vaile, which show that every case of tuberculosis so-called, means on the average three people; that in 394 cases there were 645 people. This migration of the tuberculous will occur, since it is only by migration that the patients can get the benefit of these United States subsidized hospitals. If the patient stays at home he cannot get the benefit of those; and of course, when he gets to the health State the patient and his family will both be dumped upon the community. The patient, as soon as he leaves the sanatorium, becomes a burden on the community, together with his family.

Of course the United States cannot go into the business of outdoor relief and nobody wants it to. But we cannot keep clear of the consequences of not going into this because the family is there; because the over burdened charities will not then be able to give the tuberculous patient himself good care; hence the patient will be worse off than he was at home, because at home he had friends, relatives, societies to whom he could appeal. In the new place he has no one.

Then, secondly, the United States can bear only a small part of the burden which it thus produces and the more poverty thus produced breeds more tuberculosis. It has been said that the health States, if they choose, can refuse this offer. They cannot. They would have to take up this burden. How can they refuse it without being called cruel, without being called hard-hearted? So far as I can see, the health States cannot help themselves. They are given apparently an option, but it is not a real option.

I think it has been generally agreed in this discussion that few, if any patients, will be sent home. Nobody is sent home against his will and no good reasons have been given by which one can persuade tuberculous people to go home.

Then there is the settlement question. Pretty soon they will acquire a settlement and cannot be sent home.

Under the bill, will many more tuberculous patients go where they do not at present? I think, yes. If they go, will many want to go home at the United States' expense? I believe, very few. Will many be enlightened by the United States as to the climatic advertisement and so stay home? I do not know; I do not see how we can answer that question. But it seems to me that what Miss Vaile has said about the effect of words as against the effect of deeds, should be considered. How many indigent migrants have families and take families I do not know. Miss Vaile has given you some figures. How many of them when they leave a sanatorium, will be unfit for work and so a burden on the community? I do not know, but I should suppose, from what I have heard, that a very

large proportion would be thus unfitted. They would not, therefore, be an asset to the community.

Finally, how long will they stay in the subsidized sanatoria? That I cannot answer. We don't know what power the United States might exercise in that respect. We can imagine their saying, "You shall not leave here until you die; that is the proper time to leave." That would be the proper thing to say from the public health point of view, but I can hardly imagine any government that had the courage to say that absolutely.

A Member: In leprosy they do.

Dr. Cabot: In leprosy they do, because leprosy finds the community in a very different state of mind. On the whole, then, it seems to me that this bill would increase tuberculosis and not accomplish the end that it attains.

Dr. George M. Kober, Washington: Although a strong opponent to the so-called subsidy system to charitable institutions, and a firm believer in the doctrine that every community should care for its dependents, I have urged the enactment of the Kent Bill for the following reasons: —

As a result of exaggerated estimates, both in and out of the profession as to the curative value of climatic treatment a tremendous migration of consumptives into certain States, notably Colorado, California, North Carolina, New Mexico, Texas and Arizona, which have become famed as health resorts, has taken place.

It has been estimated by our own Association, that from 10,000 to 15,000 consumptives migrate every year in search of health. It is perfectly natural that a large number of patients in their struggle for life, but financially unable to make suitable provisions, are among those seeking a cure in distant localities. Such patients are naturally obliged to undergo privations, and many have to earn a living when totally unfit for work. The result is a hopeless breakdown and we were told by Mr. Frank D. Witherbee in Charities as early as November 6th, 1904, that in Phoenix, Arizona, public and private charity is taxed to the uttermost, and that three-quarters of the money expended on the inmates of the almshouses goes to alien consumptives.

According to Dr. Carrington of the Public Health Service 18½ per cent. of the migratory tuberculous patients in Redland, California, were indigent. In 1914 out of 5,320 persons, who died from tuberculosis in California alone, 427 had been in the State less than one year.

The question naturally arises who is to blame, and what is the remedy for this deplorable condition. It cannot be denied that members of the medical profession in extolling the curative virtues for tuberculosis of certain climates and localities have afforded an opportunity to commercial interests to advertise such health resorts. Dr. G. G. Tyrell the accomplished secretary of the State Board of Health as early as 1894 called attention of the profession and the public to the communicability of pulmonary tuberculosis and the undesirability of inviting its victims to the State. I attended the sanitary conference at San José in April, 1894,

and with others pointed out the consequences, which sooner or later would ensue. It is strange, but true, that in doing so the Board of Health should have been attacked by heartless or thoughtless speculators and even by members of the medical profession, whose ignorance of well established conclusions was painfully apparent. Suffice it to say, that the States, which have invited the victims of consumption to breathe their pure air, have suffered the penalty, not only by the burden of care of a large number of indigent non-resident consumptives, but also from the effects of promiscuous mingling of consumptives with healthy persons.

I firmly believe, that not only the States in question, but the country at large, share the responsibility in the solution of this problem. While much has been done by social workers to discourage migration of consumptives, the evil will not stop until every community is impressed with the fact that a cure in early cases of tuberculosis depends chiefly upon rest, good food, pure air and hygienic surroundings and that it is cruel and worse than useless to send a consumptive far away from home, without adequate means to secure whatever auxiliary benefits there may be in climates. This much we owe to the patients and the commonwealth, and can urge with a clear conscience when we recall numerous instances, where patients derived little or no benefit from a sojourn in the Southwest, and yet made distinct gains upon entering a sanatorium in their own State or county.

Until the campaign against indiscriminate migration is effective, is it just or fair to impose all the burden of caring for non-resident indigents upon the States in question? Some of the affected States have tried to stop the evil by informing the people that without adequate means they will become stranded and much worse off than before. Our own Association, in May, 1912, endorsed the resolutions adopted by the Southwestern Conference on Tuberculosis held in Texas, April 12, 1912, and again issued a warning in June, 1915, but so far without effect. It has been suggested that these States should quarantine against tuberculosis, or that the federal government should regulate interstate travel of consumptives. Both of these suggestions are worthy of serious consideration, but on account of the widespread character of the infection, the questions of expense and the constitutionality of such a procedure, the difficulties must be apparent. Finally the forcible return of helpless patients to the States from which they come has been suggested as a justifiable measure. Unfortunately most of the indigent non-resident consumptives become burdens to these States only when they are down and out, or in such an advanced stage of the disease as to render their deportation a question of humanity and a menace to public health. In such instances, especially when the patient has not acquired a legal residence in the State an effort should be made to have the State reimbursed by the commonwealth whence he came, but pending all this, the poor patient should be cared for in standardized institutions as contemplated by the Kent Bill. These poor people are in no way to blame for their sad plight; they are the misguided victims of erroneous doctrines and the

indiscriminate recommendations of the medical profession and deserve better care, than that afforded by the average almshouse hospital.

If the federal government can successfully and at a considerable expense cooperate with the States in the matter of agricultural experiment stations, and in the prevention of diseases in the lower animals and plants, there is no reason why under the common welfare clause it should not participate in the solution of this problem, involving as it does, divided and yet almost nation-wide responsibilities.

I believe it is a serious error to assume that federal subsidies would encourage migration. The spirit of the bill is clearly to discourage migration, and since it will be to the financial interest of both the federal government and the States, to diminish the evil, we may be sure that the administration of the law under the Public Health Service will bring about the desired result.

Last but not least, I am confident that the enactment of the Kent Bill must inevitably result in a participation on the part of he Public Health Service in the solution of the tuberculosis problem, in its broader aspects, and when experts of the federal government after due investigation formulate opinions on interstate control of tuberculosis and kindred problems it may be assumed that such statements will carry great weight.

For the purpose of promoting the efficiency of our nation-wide campaign against tuberculosis I consider the speedy enactment of the Kent Bill of vital importance. A small committee may very properly be empowered to prepare such amendments as will safeguard the bill against abuses, but any radical changes may defeat the humanitarian object which it seeks to accomplish.

Dr. Philip King Brown, San Francisco: I dislike very much to be on the opposite side of the fence from Miss Vaile and Dr. Cabot, but there are some very reasonable objections to their criticisms of this bill. I therefore wish to make plain a few facts in regard to the construction put upon the bill by Miss Vaile particularly, also by Dr. Cabot, which I think will put the matter straight in your minds. We are exceedingly indebted to Miss Vaile for calling attention to the fact that Section 3, providing transportation at the expense of the government for a patient to return home, does not prevent this patient from going to another State and receiving subventions, because this section does not specially forbid another State giving him care in its institutions.

I called this to Mr. Kent's attention, and he said that line 16 should read "any person once furnished transportation shall thereafter be ineligible to benefit under this act," instead of "under this section," as it now reads.

It would seem more difficult to understand Miss Vaile's argument if one did not know some of the conditions which hold in Colorado regarding scattered population, absence of industries and wholly inadequate means of caring for even one-tenth the normal number of its own tuberculous poor, to say nothing of those dumped down upon it from other localities.

Probably no State, unless, possibly, New Mexico, is confronted with the peculiar position Colorado has. It has only one large city, Denver, which with Colorado Springs shares the reputation of having a climate and elevation notably beneficial to consumptives. For this reason and because it is the nearest point to the East, the wanderers in search of health and new jobs land there.

Colorado is largely settled by people who have gone there for health reasons or to work in mines. There are practically no industries in the entire State except mining, and it is not a place where people can easily earn their living in trade or farming. Therefore it presents an extreme exaggeration of the difficult conditions which confront the handicapped in California, which receives annually 100,000 invalid visitors, of whom nearly half settle down as permanent residents and most of whom become bread winners. We are perfectly willing to take care of those who come to us and chance to become indigent in California, but we do not want the indigent consumptive from without.

Both Los Angeles and San Francisco, each of which has double Denver's population, have at least six times the number of free municipal beds for consumptives that Denver has. Scarcely a town in California of one-tenth the population of Denver but has as many or more free beds than Denver. It is hardly to be wondered at that their social workers want no outside consumptive poor when they have such inadequate provision for their own.

Miss Vaile has considered the subject solely from the social worker's point of view, and it is an established fact that it is fatal ever to consider a public health question first of all in that light. She has presented the matter very skilfully but I hope to show you why her point of view is wrong, having indicated that the reason for it arises from her connection with social work.

The social worker who neglects the medical aspect of an epidemic or contagious disease for its charitable consideration is a danger. Would you spare the vermin infected mattress of a typhus case for the comfort of a family or the scarlet fever infected toys of the sick child for a healthy child with none? During the plague epidemic in San Francisco the U. S. Public Health Service caused hundreds of poor families to be turned out of their shacks, which were destroyed sometimes by fire when the plague infected rats were bad in certain districts. The acute menace aroused people to corresponding reaction, and the community accepted and met uncomplainingly the hardships which resulted from the necessity of placing public health before habits. The same thing holds with tuberculosis except that the menace is old and the community has become accustomed to it and is indifferent. We have come far too much to regard tuberculosis as a social problem and unless we face squarely about and attack the contagious aspect in a medical way, the social part will be of no avail and will grow larger and larger.

It is only in States where great stress has been put on preventive measures that any headway against the disease has been made. We must

make greater efforts medically if we would abate the tuberculosis danger, and if in so doing the social problems are for a time increased, that must be the cheerful contribution of society to the cause of overcoming a disease in which the indirect tax of life and money is so great.

The chief point of Miss Vaile's argument hangs on the fact that the bill is not going to do what it has undertaken to do — stop the migration of indigent consumptives. In consequence there will be a flooding of States like Colorado with indigent consumptives who cannot in their home States get the benefit of Federal standards of care. It would seem reasonable to any one acquainted with the work and power of the Public Health Service to suppose that in accepting the responsibility imposed on them by this bill, they examined it carefully enough to see the point raised by Miss Vaile. The bill was not even formulated until it had been thoroughly considered in its legal, social and medical aspects by the Secretary of the Treasury and the Public Health Service, and modified to cover such criticisms as they made. Let us examine the U. S. Statutes under which the Public Health Service operates:

Under the provisions of the Interstate Quarantine Act of February, 1893, Section 3. . . . The Surgeon General . . . shall . . . cooperate with and aid State and Municipal Boards of Health in the execution and enforcement of the rules and regulations of such board and . . . of the rules and regulations made by the Secretary of the Treasury to prevent the introduction of contagious and infectious diseases into one State . . . from another State. All rules and regulations shall operate uniformly. Places within the U. S. that have no quarantine regulations under State or Municipal authority . . . or where they are not sufficient to prevent the introduction of such diseases into the U. S., or into one State or Territory from another . . . the Secretary of the Treasury shall . . . make such additional rules and regulations as are necessary to prevent the introduction of such diseases.

In the Interstate Quarantine Regulations, U. S. Statutes at Large, Vol. 27, p. 114, Section 1, pulmonary tuberculosis is placed fourth on the list of interstate quarantinable diseases with plague, cholera, typhoid fever, yellow fever, smallpox, leprosy, typhus fever, scarlet fever, diphtheria, measles, whooping cough, poliomyelitis, spotted or tick fever and epidemic meningitis.

Section 28 provides for common carriers a special set of rules for transporting cases known to be suffering from pulmonary tuberculosis in a communicable stage. The provisions are explicit as to special sputum cup and its use, gauze, tight containers, disinfection of gauze after use, closing the compartment vacated by patient and disinfection.

Section 33. Interstate sanitary officers and State, Territorial and other health authorities shall render to the Surgeon General of the Public Health Service monthly reports as to the prevalence of . . . tuberculosis and other diseases notifiable in their respective jurisdictions.

Under the provisions of this act and the sections in the U. S. Statutes the Secretary of the Treasury could to-day make any regulation he wished

to stop interstate migration of consumptives, and details of how it might be done have been carefully studied by the Public Health Service. It can readily be understood by the care with which Section 28 of the Interstate Quarantine Statute was drawn that vastly more care was intended to be used in the transporting of consumptives than ever by any remote chance in a single case was ever exercised. It was not intended to stop the migration of such cases but to prevent its becoming dangerous. The extent of migration as well as of the disease throughout the entire U. S. could be made a matter of record and investigation from now on under the provisions of Sec. 33, and doubtless will be when there is reason for it as there will be under the workings of the Kent bill. In other words the Interstate Quarantine Statutes to-day give the Secretary of the Treasury unlimited police power to stop migration of consumptives wherever it is found that that migration is carried on in a dangerous way or threatens any locality with danger or imposes on them by reason of their inability to handle it a burden which is serious.

Any one can see from these statutes and regulations that even without the Kent bill the Secretary of the Treasury through the Public Health Service has the power to-day to prevent practically every consumptive from entering a new State on a common carrier. Certainly none of the provisions of these regulations are ever lived up to and the reason is simple enough. We have always been too accustomed to the danger of tuberculosis. Its presence everywhere about us and the daily contact which each one of us has with the disease has made us indifferent and careless. And yet no case outside a properly run sanatorium is free from danger unless every possible precaution against contagion is taken. No source of danger is so great as that offered by the poorer class who rarely consult physicians until far advanced in the disease, at which time each of them has exposed to contagion many people. It would be bad enough if they remained at home thus limiting to some extent the danger which is multiplied by each move. There is no way of estimating this spread of the disease, but it is certain that the number of cases who acquire the disease in any other way (through milk for example) is negligible. The Kent bill by dealing with the problem as it concerns interstate traffic seeks to lessen this exposure to the public by overcoming the drifting among the most unstable and dangerous element in society — the indigent consumptive.

Dr. Thompson Frazer, Asheville: That the tuberculosis problem is one of national importance and that the Federal Government should interest itself in it is, I think, beyond doubt. But I do not see how the proposed measure will help, in any degree, to solve the problem relating to the control of tuberculosis; on the contrary, I believe that there are certain disadvantages to the plan as outlined in the bill. I speak from the viewpoint of one located at a health-resort, and I think that it is only such a one who can foresee the practical outworking of such a plan. No one, unless he is located at a resort town, has any conception of the number of tuberculous individuals, many of them in advanced stages

of the disease, who, insufficiently provided with means come to the resort hoping that a few weeks or months will set them on their feet again; no one, unless located at a health resort, has any idea of the number of these individuals who must be supported by the town — the charities — or must be sent home.

At first sight any measure which tends to provide relief to these sufferers would seem to be a very desirable one, and as tuberculosis is a national institution it would seem peculiarly the part of the Federal Government to contribute to the support of these sufferers. A little consideration of the question, however, is enough, I think, to convince one that there are certain very decided objections which may be opposed to this measure. What would be the result if this bill became a law? The results, as I see them, would be three.

In the first place, there would be increased migration of consumptives. Any locality stamped with the seal of government approval would attract the migratory consumptives in herds and droves. Now, although the bill provides that only those who have migrated without intent to secure the benefits of this act shall be eligible for admission to the sanatorium or hospital, it would be very difficult and very delicate, as Miss Vaile has well pointed out, to distinguish between the righteous and the unrighteous in this matter. They have come — what are you going to do with them? Common humanity demands that something be done for them: if they are not put into the sanatorium and the federal subsidy of seventy-five cents a day is not taken advantage of, it simply means that the community has to pay the entire cost of their maintenance.

Now what would be the second result? Let us consider the sanatorium itself. No State has a full equipment of sanatoria, there are not enough to go round as it is; but what chance would the local consumptive (for whom the sanatorium was designed), what chance has he to get into his own sanatorium, if, in addition, the institution be required to take care of the so-called interstate cases?

The third point has reference to the local tax-payer. Is it just, is it reasonable that the tax-payer, who at present is unable properly to take care of his own tuberculous individuals, shall be compelled, in addition to pay one-half the upkeep of these migratory individuals? From the way this federal subsidy has been talked about it would seem that there are some who think that the government is doing the State a favor. Nothing could be farther from the fact. Why, it is simply making the State a dumping-ground, you might say, for the indigent consumptive and requiring the State to pay fifty per cent. of the care of the consumptive, while no responsibility is fixed on the home State, which escapes absolutely scot-free. These three results which we could count upon if the bill were passed, first, the increased migration; second, the hardship which it would work to the local consumptive in depriving him of his rights; third, the injustice to the local tax-payer — these are three objections against which I can see no possible advantages.

Now, I shall not take up the question of the care of the tuberculous

individual's family, nor of the after-care of the consumptive when he is discharged from the sanatorium, nor the matter of securing him suitable employment. I can touch only briefly on one point which Miss Vaile has brought out and that is with regard to the home State attempting to care for its consumptives in other States; I do not know whether Miss Vaile had in mind the establishment of a sanatorium by the home State in another State and I do not know whether it would be legal or practicable. There might be some objections to such a scheme.

I can see no possible objection, however, to the Federal Government's establishing and maintaining a sanatorium in each and every one of the States if it see fit to do so, and I believe Dr. Brown is mistaken with regard to this.

This brings us to the federal control of the tuberculosis problem. There is no reason why we should not have real federal control of the problem, a control that would not take up the problem piecemeal but would study it in its entirety. I think however that we cannot expect to get results along this line unless some such measure as that advocated by the Executive Committee of this Association is adopted and acted upon. This measure provides that there be established, under the United States Public Health Service, a Federal Tuberculosis Commission. If such a Commission were established it could deal with the problem not simply with regard to the one phase of migration, but it could take up the treatment of the individual, his after-care and employment and could in many ways throw light on a problem which can not be solved by any federal subsidy.

John M. Glenn, New York: The matter has been so thoroughly discussed that there is comparatively little left to be said. Congressman Kent said that his bill follows the line of least resistance. Twenty-five years' experience in social work convinces me that generally the line of least resistance leads to trouble and if we want to accomplish anything large we must face the music and follow the line of greatest resistance. It seems to me proper to suspend action with reference to this problem until we can consider together all the possibilities and decide on the course that will in the long run be likely to bring the fullest results within a reasonable time. We are greatly indebted to these California gentlemen for bringing this question up for discussion. It is an abominable thing that a few States should have non-residents dumped on them.

My chief objection to this bill is that it does not provide any real remedy for the trouble. It goes a very little way. I do not at all agree with Mr. Kent that we cannot get the United States government to give the United States Public Health Service, which has done such magnificent work, more power. If this Tuberculosis Association and other social agencies and congressmen and public health officers will get together, they can get a great deal through Congress. They can stir a public opinion that Congress cannot resist. We have not tried to stir up public opinion sufficiently and get the government to attack the tuberculosis work vig-

orously. So I hope that we shall not be satisfied with anything like a little subsidy of seventy-five cents apiece for an indigent, tuberculous patient.

Now, another point. This is not a public health question any more than it is one of material relief; it is both. (I have watched the working of both the lump sum subsidy system and the per capita system in several States.) The subsidy system has deplorable consequences. That is one reason why I feel anxious about the effect of this bill if it should be passed. Reference has been made to appropriations for education. Let us remember the difference between such appropriations and those for taking care of indigent patients. The former makes people want more education, which is a good thing. It attracts them to education. An appropriation for material relief makes people want more relief, which is demoralizing. The two things are at opposite poles. The reason for making subsidies for education is just the reason why we should be cautious about giving subsidies for hospital relief which are not to be administered by the government. Hospital relief is material relief. It provides for the care of the patient, as well as treating the disease, so I have no doubt that this bill, if passed, will increase migration instead of lessening it. The experience of social workers everywhere confirms this view.

A question has been raised as to the ability of the United States Public Health Service to raise standards unless it has a lever through subsidies to State and county and private hospitals. A great deal has been done by voluntary agencies to raise standards without subsidies. Take, for instance, the playground work, for which Mr. Kent has done so much. Playground methods have been immensely improved by the work of the Playground and Recreation Association of America and of the Recreation Department of Russell Sage Foundation. All through the social work field voluntary work is doing more for raising standards than governmental work is doing.

Congressman Kent: I was just going to ask if all these have not been subsidized, have not had subsidies from the Sage Foundation?

Mr. Glenn: The work I refer to has been done without subsidizing. If it is right and wise to subsidize agencies in California and Colorado and Asheville and other places for taking care of tuberculous patients, why should not New York have a subsidy for taking care of non-residents — not only for hospital care, but for other kinds of care?

Congressman Kent: Exactly the same thing is true of any State, this is not confined to any State.

Mr. Glenn: I am merely asking this question to show the big field we get into when we start to subsidize. If we are going to subsidize, we would better subsidize agencies in the States where patients belong and encourage them to keep their patients at home. Let us not stop merely because it will be more expensive. If it is wise and right for the government to grant subsidies, then it should encourage hospitals and sanatoria all over the country to improve their standards and encourage all the States to keep their people at home instead of confining its aid to a few

States which have been imposed upon by the other States. I think it is clear that the provision made by this bill is inadequate and that if it is passed we shall be entering upon a scheme which is unwise and will involve unlimited appropriations. I hope that out of this discussion will come some sort of an agreement by which we can get a decidedly larger and more effective plan for dealing nationally with the whole tuberculosis problem than is presented by this bill. I think the resolution which was passed by the Board of Directors of the National Association asking for a division of tuberculosis in the United States Public Health Service is the best way to get at the whole problem of lessening tuberculosis throughout the country.

Dr. Karl Schäffle, Harrisburg: In connection with the subject under discussion it may be of interest to you to know the constructive policy of an eastern State, the largest industrial State in the Union, long known to employ vast numbers of aliens. Since the establishment in 1907, in Pennsylvania of a Division of the Department of Health for the Control of Tuberculosis through which three State Sanatoria with a total capacity of 2300 beds and 116 dispensaries (one at least for each county) were opened, Commissioner Samuel G. Dixon has made of each one of these units in addition to its other offices, a bureau of information. From such centers patients, medical profession and public are taught the cause, means of prevention, recognition and treatment of tuberculosis in general and the resources of Pennsylvania in particular. The consumptive is encouraged to save time, money and strength by staying in his own State.

It is rather interesting to note the results of this policy as shown by a review of the "up-follow work" conducted through the dispensaries. From the beginning of 1907 to the end of 1914 there were 62,044 patients discharged from the dispensaries. With the beginning of 1914 the dispensary nurses were required to visit all former dispensary patients as well as the ex-sanatorium cases which they had been visiting every six months and reporting for a period of two years after discharge. There were 8,688 former dispensary patients reported during 1914. Of these 3,225 had been discharged because of removal. Out of the 3,225, 1,971 had become untraceable, 1,160 had merely changed their residence within the State, 332 were traced to other States and 181 had left the country. About half of those who moved to other States simply crossed the border for a short distance in search of employment during the period of industrial depression.

Now, as Pennsylvania was not among the States mentioned by the speakers from Colorado and California as importers of tuberculosis, it might be well to sum up the Department's policy in a given case. When an alien presents himself at the dispensary, his history is taken and he is examined and in any case is given all the advantages of dispensary care—advice, home supervision, milk or oil as supplemental food and if necessary, medication. While ineligible for sanatorium admission until he has had a year's residence, his application is filed by the dis-

pensary and kept with the waiting list at Harrisburg. If his condition and length of residence indicate that he has slipped through the immigration authorities with his disease unobserved, measures are taken for his deportation to the country from which he came. In any other event he is encouraged to become an American citizen as soon as possible.

When patients are discharged from the dispensaries because of removal, they are traced as carefully as possible and when known to have gone to other States the Departments of Health of those States are notified by means of a regular form which gives the patient's name, address, length of treatment, classification upon discharge and sputum report.

So much for the patients. The general public is taught through the Department's motion pictures entitled "Pennsylvania's War Against Tuberculosis" and by exhibits, lectures, monthly bulletins and weekly talks in the 900 newspapers of the Commonwealth that it is unnecessary to go to any of the so-called "health States" in view of the advantages afforded by Pennsylvania.

Assistant Surgeon General W. C. Rucker, Washington: This bill has the approval of the Secretary of the Treasury and the Surgeon-General of the United States Public Health Service. In the second place, I am speaking personally, I would be a great deal more in sympathy with those who have opposed this bill if they had offered something in place of it. It is very easy indeed to tear down, but it takes a master mind to build up. There is no such thing as ideal legislation. You cannot create ideal legislation, and when you start to legislate you are bound to make mistakes, no matter who makes the legislation.

That sacred document, the Constitution of the United States, does not contain one word in it about health. In the preamble we have the welfare clause and we have the control of commerce between the States. It is only in the control of interstate commerce by the federal government that it can get into the tuberculosis problem. Now, I think we all admit that the federal government must be brought into the tuberculosis problem, excepting for the laws creating those institutions which care for the government beneficiaries, and in the immigration acts there is not one word in the federal statutes about tuberculosis, and I think you will agree with me that it is about time that that word got into the federal statutes. If this bill does no other thing than make the United States government officially recognize the fact that tuberculosis exists, it will be doing good.

In the second place, a remark was made here and occasioned much applause, because it was a very pretty sentiment, that the federal government should take care of the people at their homes. The federal government can not take care of these people at their homes because they come in contact with these people only as they travel in interstate commerce.

The federal government has a duty imposed upon it by the Constitution. Since the federal government controls commerce between the States, it becomes the duty of the federal government to see that these States take no harm through that commerce and just as soon as the government

sees that the States take harm through that commerce it becomes the duty of the federal government to immediately apply such remedial measures as are at hand. It has been argued from this rostrum that there will be an increase in the migration of the tuberculous by reason of the enactment of this bill. I disagree entirely with that statement.

In 1798 the federal government created a Marine Hospital Service for the care and treatment of sailors. What was the precedent for that? The precedent for that was this: During the Colonial days the sailors were constantly falling ill in our ports and the Colonies represented to the Crown that since these people — it is exactly a parallel situation with the one that we have now,— that since these people were not citizens of the Colonies and paid no taxes in the Colonies, it was the duty of the Crown and not the individual colony to take care of them. The Crown did so and subsequent to the Revolution an attempt was made in the first session of the first Congress of the United States to create a Marine Hospital Service. There were a few people just exactly like the people who are fighting against this bill right now who said that their sailors ought to have some care and relief and the Colonies ought to have relief, but the plan proposed would not do. It was the wrong way to go about it.

And so the thing went on from the First Congress until the Third Congress before they got any legislation through at all. Then a good, stout little man from New York by the name of Livingston, got up and ran the steam roller over them and put it through. Now, this legislation was not ideal legislation; not at all. But that legislation started something. It began something. We went along under their legislation and it was found that it did not work out just as well as we wanted it to, and we learned as we went along, and now the thing works perfectly.

Now, as for the migration, every man who is serving, or woman, either, who is serving on a registered, licensed or enrolled vessel of the United States is entitled to treatment under their Marine Hospital Act, and under that Act there is maintained at Fort Stanton, New Mexico, a large and, as you know, a very fine tuberculosis sanatorium. Any one of you in this room that has tuberculosis and wants to have treatment from the government can go right down here to the wharf and sign on any vessel that you can get to take you. After you have signed you can say that you feel sick, the master fills out your certificate, sends you to the dispensary of the Public Health Service; you are examined there and the government gives you a ticket and sends you out free of charge to Fort Stanton, New Mexico; there they take care of you and do everything for you. They give you clothes and everything, and they do not hold you to seventy-five cents a day. Yet we have never had, in the history of the service, any one obtaining treatment in this way.

I think there are a lot of people who are talking about this bill who have not read it. I want you to listen to this: "The Secretary of the Treasury is hereby authorized to aid the authorities of any State hospital or sanatorium through the consent and by request of said society in providing care and treatment for indigent, tuberculous people." No-

body has to take the treatment if he does not want to. In section four of the bill it provides that the Secretary of the Treasury is authorized to issue regulations governing the designation of institutions and establishment of standards and for otherwise carrying out the provisions of this act. It means that you go to work and put upon the federal government a responsibility which involves the expenditure of money. You can be very certain that the federal government will see that it is not imposed upon in the expenditure of that money. Section Four provides for regulations which can be drafted to control and to prevent the migration of tuberculous persons who so migrate for the purpose of getting the benefits of this bill. If that were not enough, we have plenty of authority in the law of 1893 to promulgate additional regulations as amendments to the interstate quarantine regulations. It would be a very easy matter to add to those regulations a clause something like this: "Persons knowing that they are tuberculous shall not undertake interstate travel unless they file with their Surgeon-General or his accredited representative a statement that they do not do so for the purpose of receiving the benefit of the Act, etc."

A simple regulation like that would control this absolutely. And let me state that under the law of 1893 and under the law of 1904 there are penalties imposed, both a fine and imprisonment, for infraction of the interstate quarantine regulations. The main thing, and the beautiful thing and big thing that this bill does is to bring the federal government into the tuberculosis fight. This will not end the federal legislation with regard to tuberculosis; it will just begin it, and it will be found that, as time goes on, any mistakes that are in this bill will be remedied. The main thing is to get the government into it. I am afraid that there has been consideration in regard to the families of tuberculous people and their becoming a charge on charity rather than in regard to the care of tuberculous persons themselves.

Dr. Dunning S. Wilson, Louisville: One is indeed bold who will differ with the members of the Public Health Service, and especially when one of them has made such a delightful impression upon this audience. I take it, however, that when the United States Marine Hospitals were finally established, they were established because there was a groping in the dark. Now, we are provided with so much more light than our revered ancestors had at that time, therefore, if we see a better solution, we should adopt it. It seems to me that the acute minds of men who have been interested in this vital problem of tuberculosis as a specific problem, might well be considered when they offer a solution thereof.

In opposing the Kent bill, I do so because of a sincere belief in its inefficacy. If you will stop to think a moment that if there are 200 persons (and this would be a minimum number), receiving treatment from the Federal Government at seventy-five cents a day to the hospitals, that amounts to something alone of $54,750.00 a year. This sum will pay — and General Rucker can correct me if I am wrong — the salaries of eighteen Past Assistant Surgeons as an addition to the United States

Public Health Service. If those eighteen Past Assistant Surgeons appointed by the United States Public Health Service are detailed to study the problem of tuberculosis and attack it like they have the bubonic plague on our sea coast, we will have such information at hand that not only the localities, but the States themselves, will rise and make provision to care for their own.

Robert J. Newton, San Antonio, Tex.: We people from Texas never like to be overlooked. We have the same problem in our State. When this bill was drafted and introduced the first time we studied it, and made some suggestions of amendments. We had a meeting of social and public health workers at Fort Worth. We submitted these amendments to some of the leaders at Dallas and we later had a meeting at San Antonio of social and public health workers and it was agreed that the amendments would meet the problem as it exists in Texas. I admit there is an exception and that is from one corner of the State, El Paso, but I believe they have been misled by "false counsel," as one speaker said a moment ago.

In every proposition of this kind we naturally differ. I want to call your attention to the fact that out of fifty tuberculosis organizations which have expressed themselves, thirty-four of them were for the bill. It seems to me that this is a good majority. Nineteen State boards of health have also endorsed the measure, and we have any number of endorsements from county and city boards of health, some commercial organizations and from many physicians from the State. If they could go into the record it would make a large volume.

I have been impressed with one thing, that those who have opposed this bill, and also the bill to place the entire responsibility on the Federal Government, by the establishment of Federal hospitals, have not offered anything in place of these two measures. Now, it is true, as they say, that we ought to investigate further. We ought to do more educational work, certainly, but I want to remind you, that while we are doing so, there are thousands of people out in the Western country who are starving, and who are dying from lack of care. They are asking for bread and you offer them a stone in the shape of education and more investigation. I would like to hear from some of the opponents of this bill as to just what they are going to do with these people. They have not yet told us what they will offer as a substitute for the Kent bill.

Congressman Kent: I just want to say one final word. Nobody realizes more clearly than I that this bill is tentative and merely a start. I think our able representative from the Public Health Service has said that thoroughly well. I have been fighting for this bill for over three months. I am going to keep on fighting for it as long as I am in Congress, and I shall try to be there long enough to see it made law.

Please do not spend your valuable time in carping and in criticism. I need your help. I have no pride of opinion. Don't always act in the negative, but give me helpful advice and constructive suggestion, and I shall be meekly and modestly grateful.

DISPENSARY STANDARDS

By F. Elisabeth Crowell

New York

There are tuberculosis dispensaries to-day that can show little beyond good intentions as a reason for their existence. Good intentions serve chiefly as paving material for certain unmentionable regions we are told. Yet good intentions plus enthusiasm and energy have started most of the worth while things in this world. When the energy has spent itself and the enthusiasm has flickered out good intentions have sometimes sufficed to keep a thing going even though it lacks vitality and fails to do more than go through haphazard motions effecting but a moiety of the good which might be accomplished were knowledge based upon experience substituted for good intentions.

In the early days of the tuberculosis campaign, primitive equipment and pioneer methods were recognized and thankfully accepted as the only thing possible of attainment. As the propaganda for tuberculosis prevention and control has spread in ever widening circles, the demand for specialized facilities for the treatment of tuberculosis has increased far in excess of the available supply. The mushroom growth of tuberculosis dispensaries in the past decade has afforded little opportunity for introspection. They have sprung up over night and have continued as best they may. Some with the backing of wealthy institutions of the highest professional standing have been able to achieve a steadily increasing degree of efficiency. Others, started originally as experiments by groups of private individuals, have demonstrated their usefulness and have been taken over by the municipality, thus insuring their financial support. Still others, with meager equipment and inadequate support, depending on volunteer service entirely, have dragged along a precarious existence, fluctuating with the ebb and flow of interest and enthusiasm of the private individuals in the community.

We have gone a long way in this first decade. We have come to look askance at slipshod methods and to question the quality of work accomplished by such methods. Ideals of clinic work have become working realities in certain clinics where the combination of professional skill, unflagging interest in the tuberculosis problem, and adequate financial support has existed. Standards of clinic work are being evolved from the accumulated experience of the past ten years and are being applied as a measuring rod for testing a clinic's efficiency.

Organization of a clinic's resources in physicians, in nurses and in relief funds has proved to be a most effective method of increasing facilities — of securing a larger output for the same expenditure of time

and energy and money. Finally, we have extended our original conception of the clinic's function to include a variety of allied social activities, centering largely as preventive work of most kinds must, in the needs of the child.

It has been my privilege recently to make for this National Association a study of the work of tuberculosis dispensaries throughout the country with the object of ascertaining the kind of work being done by these various dispensaries on the basis of which certain definite standards might be established to which dispensary work generally should conform.

For the purpose of this study, in July, 1914, about 200 questionnaires were sent out to a selected list of representative clinics. Over one-half responded to the request for information. Of these a few were omitted from the study because of incompleteness.

There finally remained adequate information covering 116 special dispensaries for tuberculosis, which may be considered fairly representative of conditions throughout the country. Twenty-four States are covered, from Connecticut to California; from Maine to Georgia. Sixty-four different cities and towns are represented, twelve of which are maintaining more than one dispensary. In only five of these cities is the work of the several tuberculosis dispensaries coordinated through some organized scheme. Complete records of dispensary work are available for five principal cities, Chicago, Cleveland, New York, Atlanta and Richmond. The two extremes are represented by the splendidly organized machinery available for dispensary work in the two largest cities in the country, New York and Chicago, and by a small dispensary maintained by a private association in a little town of Massachusetts, having about 15,000 inhabitants. The smallest town supporting a dispensary was in Maine, having less than 10,000 inhabitants, which boasted ninety-six patients with a clinic attendance of 554 visits in one year. The oldest of the dispensaries included in the study is connected with Rush Hospital for Consumptives in Philadelphia, which was established in 1891. The Presbyterian Hospital in New York followed three years later with a specially organized class for the treatment of tuberculosis in its out-patient department, to be followed in 1899 by the Boston Dispensary. Seven of these dispensaries were organized in 1903 and 1904. According to the date of their organization, the others were fairly evenly distributed from 1906 to the present year. Eight were organized in 1914 and were therefore unable to give certain statistics relating to attendance and nurses' work.

Of these 116 clinics 47.4 per cent. are now supported by municipalities. Thirty-three per cent. are being maintained by private associations; sixteen per cent. are supported by institutions; three and one-half per cent. are ostensibly maintained by private associations or institutions, but are in receipt of a certain amount of public monies.

The information collected in the study may be roughly classified as follows:

1. General description, including the methods of organization and administration, its coordination with other tuberculosis agencies in the community.
2. Special features; such as special classes, night clinics, children's clinics.
3. Records, including forms used, method of filing, system of checking patients' attendance and nurses' field work.
4. Clinical work, including statistics of attendance, methods of diagnosis, laboratory facilities, the treatment of doubtful cases, and preventive work.
5. Home care, including statistics regarding the number and kind of workers, visits made in patients' homes by nurses and by physicians; and the giving of relief.
6. Cost, including details re salaries, supplies, equipment, drugs and other expenditures and the assessment of fees by the clinic for medical advice or for medicine.

According to the form of organization tuberculosis dispensaries fall into two classes:

1. Independent institutions organized for the sole purpose of treating tuberculosis.
2. Separate classes or divisions of general out-patient departments.

Of the 116 dispensaries included in this study, 71½ per cent. belong in the former class, the remaining 28½ per cent. in the latter.

The independently organized tuberculosis dispensary is a law unto itself with one object in view — to facilitate in every possible manner the handling of one particular disease. The hours it is open, the methods which are followed, the record system in vogue, are determined by the needs of the particular class of patients it aims to serve. The cost of maintaining such a dispensary is naturally greater because it must meet all of its own overhead charges, such as rent, fuel, light and service.

The dispensary which is run in conjunction with an established institution, escapes these overhead charges which are carried by the institution itself, and are increased very slightly if at all, by the addition of a special department.

On the other hand, it is very apt to happen that in the general hospital out-patient department the vital interest in the conduct and development of tuberculosis work lies chiefly with the physician and nurse who are actually doing the work. The superintendent of the institution and the board of managers are being harassed by every department of the general dispensary for recognition and support of their particular needs. Tuberculosis is one with the surgical department, the pediatrics department, the genito-urinary department, the gynecological department, all of which are clamoring for more space, more doctors, more money. The independent dispensary has only one problem to consider and can make its

plea for increased facilities to a group who are interested particularly in the one thing which it is trying to do.

Time does not permit me to go into an account of the detailed findings of the study under the various heads previously enumerated. Suffice it to say that taking the 116 dispensaries by and large, methods of operation, technique and equipment varied as widely as the geographical location of the dispensaries themselves. Records were frequently inadequate and the most elementary statistics lacking. Figures of cost were complicated by the inclusion of factors not pertinent to this particular inquiry. There was apparent no well defined policy as regards the giving of material relief by the clinics.

Considering that nearly three-fourths of these dispensaries were organized for the sole purpose of treating one particular disease, does it not seem that they should be able to pool their experiences and arrive at a definite recognition of certain standards to which they should conform? Is not the time ripe to consign to the limbo where they belong, the good intentions which are the main reliance of our weak brothers, and recognizing the tuberculosis dispensary as an integral part of the machinery for fighting tuberculosis demand that it receive sufficient support to enable it to pass out of the makeshift stage into the security of established standards of adequate equipment and facilities, and operating methods whose value has been tried and proven?

Can we not crystallize the experience gained in the last ten years into standards which should serve as a guide to communities which are establishing new tuberculosis dispensaries and which are willing and anxious to do the right thing in the right way if they are only shown how?

Can we not say:

1. That two or more dispensaries, operating in the same community, shall be coordinated by limiting their work on a district basis.
2. That regular provision shall be made for practical cooperation with other medical institutions to secure special treatment for contributory defective conditions and for morbid conditions other than tuberculosis when necessary.
3. That the adequacy of the staff of physicians shall be estimated on a unit basis providing for the maximum attendance and allowing not more than five patients per hour per physician.
4. That for urban districts, the ratio of one hundred registered cases to a nurse be not exceeded. For rural districts, this ratio will depend upon local conditions of transportation, size of district and density of population.
5. That physicians be salaried on a minimum basis of $300.00 per annum for eight hours weekly service, and shall be available for home visitation when necessary.
6. That the minimum salary for nurses be $900.00 per annum, with the allowance of one month's vacation and one full day weekly, the regular working day to be not over eight hours. Two weeks'

sick leave with full salary should be allowed in case of severe illness.

7. That the medical staff be so organized that one physician is in immediate charge who will personally supervise the medical work and be responsible therefor.
8. That the nursing staff be so organized that one nurse is immediately in charge who will plan and personally supervise and be responsible for the nursing work.
9. That three rooms or the equivalent thereof procured by the erection of temporary partitions, be considered the minimum number essential for clinic purposes, one a waiting and registration room, two for the examination of male and female patients separately.
10. That the classification of cases and results of treatment both for children and adults, as adopted by The National Association for the Study and Prevention of Tuberculosis, be followed by every clinic physician, and that for his guidance printed copies thereof be posted in every clinic examining room. The suggestion is offered that the National Association print for general distribution such copies in convenient form for this purpose.
11. That children under sixteen be separated from the adult patients and be treated in a special class in a separate room or at separate hours.
12. That night classes be held for working patients.
13. That the protection of the physicians and nurses and the hygiene of the clinic be insured by the wearing of washable gowns, the masking of patients during examination, by the provision of paper napkins and covered receptacles therefor, by the display of printed signs containing instructions concerning the disposal of sputum, by the daily washing of floors and furniture.
14. That an adequate record system be maintained which will record a minimum number of essential facts as follows:

a. Identification data:— name, age, sex, nativity, color and residence.
b. Physical data:— exposure to infection, past history, present condition, being a detailed record of the physical examination, result of special tests, sputum, urine, and other tests if made, such as blood test, Wassermann and x-ray,—(with special forms for noting physical condition of children).
c. Social data:— make-up of family, housing, living and working conditions.
d. Economic data:— income, expenditures, insurance; source, amount and kind of relief, if wholly or partially dependent.
e. Continuing notes:— of observation and care at clinic and in home for patient and other members of family, by physician and nurse.
f. Condition on discharge and final disposition.

15. That special relief funds administered by or through the clinic be expended for tuberculosis relief as such — i.e. for clothing and bedding necessary for special sleeping arrangements, for loans

to "arrested" cases to enable them to recuperate financially, for preventive work with children of tuberculous families such as the employment of teachers for special classes in corrective exercises, dietetics, etc., or the provision for summer outings, or vacation homes in the country.

16. That the responsibility of the clinic does not end with the care of the individual patient but extends to the entire family: that every member of a family in which there is a recognized case of tuberculosis should be examined, and if below par, reexamined at regular intervals — more especially should the children in these families be constantly under clinic supervision.

We hear so much talk of preparedness in these days that it seems banal to drag it in here and yet:—

70,000 French soldiers have been discharged from the army since the beginning of the war because of tuberculosis. There was no care available for them. A government appropriation of 4,000,000 fr. has made possible the fitting up of twenty-eight temporary, makeshift sanatoria in old buildings where six weeks' care will be given to some 10 per cent. for educational purposes only. For the remaining 60,000 or more nothing as yet has been done.

Germany through her tuberculosis institutions is returning 22.7 per cent. of her tuberculous soldiers discharged because of tuberculosis to field work; 17.9 per cent. to garrison duty who will soon be able to resume field duty; 56 per cent. to garrison duty; leaving only 3.4 per cent. unfit for service.

DISCUSSION ON PAPER BY MISS CROWELL

Dr. John Ritter, Chicago: I am sure that Miss Crowell should be highly complimented on this able paper which she has placed before us. Those who are interested in the tuberculosis problem, particularly the clinical aspect know the vast amount of work that has to be done to bring about so complete and thorough a report. What pleased me most in the report is the statement that the Rush Hospital in Philadelphia was in this country the first dispensary to establish a tuberculosis clinic and to which I wish to add that in our city of Chicago, Rush Medical College was the first to establish a tuberculosis clinic in its dispensary. We see in both cities the same Rush spirit so vitally interested in this problem.

I favor separate clinics on separate days for children and adults and that at every clinic suitable laboratory facilities should be available. At present time we have in Chicago, eight well established tuberculosis clinics under the management of Municipal Tuberculosis Sanitarium, and only one, that is the Rush Dispensary of which I have charge, has all the necessary facilities for proper laboratory examinations. That is because the clinic is located at Rush College adjacent to the Presbyterian Hospital and I am permitted free access to their laboratories and x-ray room, where if necessary examination of sputum, the Wassermann test, x-ray examinations can be made while the patient is waiting. This facil-

itates matters very much and ought to be available at every tuberculosis dispensary. It entails extra work and help, requires additional outlay of money and much time, but it is all well spent.

Miss Crowell speaks of universal standards. I believe that is right. There ought to be a uniform standard of work at every dispensary so that a patient coming for examination and treatment receives the same interpretation no matter at what clinic he presents himself. I wish to state briefly how the tuberculosis problem has been handled in Chicago since the inception of the tuberculosis dispensaries. We first began our dispensary work under the guidance of the late Dr. Sachs whose untiring labors in this field of endeavor will always be an inspiration to us.

In 1907 the Chicago Tuberculosis Institute began establishing dispensaries in various parts of the city. The first established dispensary was the Rush clinic as stated above. At present eight dispensaries are in existence; we had ten at one time; they have now merged into eight. We began work with 6 nurses, at present we have a nursing force of sixty-three paid nurses. Our city of two millions and a half is now divided into eight districts and we have an established dispensary for each territory. Patients living within any of these bounded districts are supposed to present themselves for examination to the dispensary within their respective districts, and all patients who come for examination at any dispensary, but live outside the district are referred back to the district in which they belong.

Here again I would like to emphasize a uniform standard for examination. Many times we have heard the remark "Your examination is so different from what we got over there." The interpretation may be a little bit different, but the method of examination should be more uniform. The appended table will give an outline of work done at the various tuberculosis dispensaries in Chicago.

REPORT SHOWING INCREASE IN DISPENSARY DEPARTMENT OF THE CHICAGO MUNICIPAL TUBERCULOSIS SANITARIUM

From September 1907 to January 1st 1916

	1907	1908	1909	1910	1911	1912	1913	1914	1915
No. of dispensaries	6	7	7	8	9	10	10	10	8
No. of nurses.....	6	7	8	11	23	31	34	45	63
No. of patients under observation..					4,943	9,159	12,598	14,972	21,989
No. of new patients first examination 155		2,320	3,181	4,069	3,953	5,039	6,532	7,127	10,852
No. of positive diagnosis (all forms)			1,145	1,287	1,369	2,151	2,797	3,538	5,239
No. of visits by patients to dispensaries			16,012	22,239	26,284	29,609	43,989	52,244	70,222
No. of nurses' visits			14,393	19,025	31,980	42,335	39,737	46,183	76,160
Percentage of cases diagnosed positive			36%	32%	36%	43%	43%	50%	48%

Started with six voluntary physicians and six paid nurses.
Now have 35 paid physicians and 63 nurses.

As you will observe we began with a corps of six paid physicians, we have now thirty-five and in the very near future about 50 more will be added to the dispensary staff. Besides this we have a corps of 50 school physicians doing school work who are supposed to send all school children in whom they find evidence or suspicions of tuberculosis to the dispensary in the district in which the school is located. We have now a well arranged dispensary service. We aim to make after all the Tuberculosis Dispensary the chief instrument in taking care of the tuberculous. Patients coming to a tuberculosis dispensary are examined, classified; this makes the clinic a sorting station, a clearing house. Patients sent from the Dispensary to the Tuberculosis Sanitarium report back to the dispensary when they are dismissed from the Sanitarium. Ambulant cases are taken care of also at the dispensary or at their homes, consequently the clinic is the main activity in the treatment and care of these unfortunates. Not only from the clinical but also from the social and economical aspect it is the main factor, for it is incumbent upon the tuberculosis dispensary to take care of the wife and family while the breadwinner is at the Sanitarium taking the cure. All this points to but one conclusion, that after all, it is the tuberculosis clinic which is the chief and determining factor in this great fight against the disease, tuberculosis, known as the White Plague.

Dr. Eugene R. Kelley, Boston: As one who has devoted a considerable portion of his time to this question, this paper is one of unusually peculiar interest to me. Possibly the thing that struck my attention the most in Miss Crowell's paper was the fact that she said nothing whatever about the much mooted question as to whether the nurse working in the tuberculosis dispensary should also be engaged in other varieties of public health work. I am constantly embarrassed by trying to solve that question.

Massachusetts, as perhaps some of you know, is somewhat unique in that it has a mandatory tuberculosis dispensary law. This law is unlike the Pennsylvania law in that the State department of health has nothing to do with the organizing, financing and directing of the dispensaries but has power and has placed upon it the obligation to see that the fifty-three cities and towns from ten thousand upward do maintain a tuberculosis dispensary. It thus has to attempt to standardize that heterogeneous body of dispensaries. It is no easy task. It is obvious that it is impossible to expect the same type and grade of work from a community of ten thousand that you do from a city of three-quarters of a million; and yet, if you have a true supervising control, there must be certain minimum standards set. This our department has done. We have certain minimum requirements for dispensaries which dispensaries must come up to before they meet with the approval of the State. Those are based upon three fundamental conditions: (1) the physical condition of the dispensary, that is, the plant, the building and rooms, in which respect the Massachusetts minimum is substantially the same as Miss Crowell

mentioned, in all other places; (2) the character of medical attendance, and (3) the nursing or social workers service.

These dispensaries cover 77 per cent. of the population of the State. They are maintained by three different methods. First, and this is rapidly becoming a decreasing factor, those which are maintained by the tuberculosis associations. There were a few years ago as many as eight or ten such dispensaries. Now there are only four. Those four, however, are among our very best dispensaries. The second type is the dispensary maintained by a hospital directly and the third and prevailing type is that maintained by the municipality.

Our experience in Massachusetts has not been very encouraging as to affiliation of the hospital with the tuberculosis dispensary. I think that sooner or later, I hope it will be sooner, we shall have all the tuberculosis dispensaries in our State directly under the control of the municipality. This means that they will come under the control of the board of health of the city or town. There is one feature, however, that needs a little emphasis, perhaps, and that is the question of the standardizing of records. I find that in the beginning the nurses and local physicians found it very hard to comprehend the importance of this. But we find it valuable, both before the patient goes to the sanatorium and when he is through and hope eventually to be able to throw some light on the question of the actual number of migrations of tuberculous individuals. By following those records you are attempting to keep the complete detailed personal entry of every case of tuberculosis that was reported in the State, which means following up all the time. We are not yet up to the point where we can say we do that in every case, but we are doing it in the large majority of cases.

As to the question of generalization versus specialization, I am tempted to say just a few words, and the first thing is, that in the small communities of under twenty thousand you will find general nursing work best. A well trained, all around nurse that is used to doing preferably school nursing work. I prefer that particular combination, school work and tuberculosis work; the nurse finds that her work dovetails together very well. Another combination is that of factory nursing work and tuberculosis dispensary work. In some of our industrial centers, there is one large plant, or perhaps rather than one, two or three that rather dominate the town. Many of them now have a so-called factory nurse.

We thought in the beginning that that would be a very satisfactory combination. In some instances, it is, but not usually, because a factory employing two or three thousand employees rapidly develops plenty of work to keep the nurses busy all the time, and we have had to disapprove and insist on a change being made in the nursing staff in several towns where that combination was expected to be carried out. There is, however, another type of development of the nursing service that we are thoroughly pleased with. It is simply broadening the scope of the tuberculosis dispensary as such, to the public health dispensary. In other

words, the board of health engages a nurse with the distinct arrangement that her time should be devoted partly to the follow-up work and attendance of the clinic and tuberculosis work and partly in other general home visitation for the board of health, that is, visiting cases of measles, scarlet fever and much of the work that medical inspectors are called upon to do. That combination has worked very well.

There is one thing to be said about uniform records, and that is, if we are going to have a uniform set of records, the large and well developed dispensaries as a rule, want to put in a great many things in the way of minutiæ and that will involve, probably, an unreasonable amount of time, clerical work, on the part of the smaller dispensaries. That is especially true when you remember that the nurse or the worker in the small dispensary must do all the clerical work. It is a very easy matter to carry that to such an extreme that the nurse is devoting too much time to the clerical work.

We have, therefore, endeavored to simplify, as much as possible, our record keeping, but we have maintained a uniform method. We do now maintain a uniform system throughout the State with the understanding that the larger city dispensaries amplify that as far as they like in detail, but the essentials must be the same throughout. This uniform system is working very well indeed.

The question of the medical service is the vexatious one, and one that we will not have solved for many years to come in a satisfactory manner. It is indeed difficult to find just the right type of medical service, especially in medium sized communities, and, strange as it may seem, my experience is that it is easier to solve the medical problem in the communities of ten to twenty thousand than a community of thirty thousand or fifty thousand. I don't know just why it is, but it is a fact. Perhaps because in the smaller community nearly every doctor feels a direct personal responsibility.

Rather against my advice and judgment, some of our district health officers, under whose immediate supervision dispensaries are placed, brought about the establishment of the universal medical staff in some of our smaller towns. This means that practically all the physicians in the town come on the dispensary staff. In small towns this scheme has worked very well. In the first place, every man in town has felt a certain degree of personal responsibility for the success of the dispensary. It causes him to brush up on tuberculosis diagnosis in general and in communities of this size it is not reasonable to expect an expert, a specialist on the diseases of the lungs. The physicians get more and more in the habit of consulting with each other, and I think the general tenor of this work improves.

In the other type of communities,— larger cities where one would expect to find plenty of physicians with special qualifications available who would give ample time to the work, this volunteer mixed staff arrangement does not work as well. These communities are so large that the individual physician on the staff will not feel so much personal responsi-

bility or liability to criticism. For this reason a large staff is not as successful as one having a smaller number of physicians,— one or two. On the other hand, there is so much work necessary in those larger clinics that it is not fair or reasonable to expect gratuitous service. For this reason I feel that the question of the salary of the physician becomes a more and more important matter in the success of the dispensaries the higher up the scale you go in population of the cities.

As a matter of abstract justice it is perhaps easy to say that even in small communities the physicians should be salaried, and on the whole I feel that results are more satisfactory where physicians do receive a reasonable compensation. To sum up in Massachusetts, we feel that for the success of the tuberculosis dispensaries there are three fundamental factors: the nursing service, the medical service, and the location and the equipment of the dispensary itself. On the whole we feel so strongly the overwhelming importance of the nursing service and the effect of the personality of the nurses in the success of the work that we have evolved as the result of our two years' experience in trying to supervise fifty-three tuberculosis dispensaries of widely varying characteristics a little aphorism in which we sum up that in our judgment the efficiency of tuberculosis dispensaries is divided about as follows: 85 per cent. depends on the nursing service; 10 per cent. on physician or medical service; 5 per cent. upon physical equipment.

Dr. Dunning S. Wilson, Louisville: I trust that the best eulogy that I can give to Miss Crowell's paper will be to discuss it in so far as I can from the national aspect and to eliminate as much local coloring as I can, in order to take up certain points which she has so carefully enunciated in the tabulation of the report which she has so carefully analyzed.

First: Is it advisable, after these years of study on the part of large groups of people throughout the country, to establish standards? Undoubtedly, yes, provided the persons who have the making of those standards will get the viewpoint of the smallest community which may be contemplated. Some of us have traveled a little bit farther than others and we may lose sight of the real fundamentals and ask for a standardization which is far beyond the ability of the majority of the people to carry out. To add anything to what Miss Crowell has said with reference to the sixteen or seventeen points which she so ably referred to, would be impossible. Looking at it from my own personal position, I do not see how she could have said less and yet it might be very much like our own methods of speech or writing — we find that sometimes we may more briefly, more concisely, state the things and not make them apparently so involved; it may be that, that improvement can be carried out without any loss of strength. That is the most important thing, not to lose the strength of the value of these standards.

It is very difficult to know what to do with relation to the keeping of uniform records, irrespective of the great value of such records, and I don't think any one can gainsay their value. The nurses themselves have the greatest difficulty in adroitly and diplomatically urging and suggest-

ing that the medical examiners — I am speaking especially regarding the volunteer physicians — they, I say, have difficulty in getting these physicians to put on the records what they think they find. All have records, I know. I, myself have many well equipped young women who go into the smaller communities after having finished their nursing and training work with records in hand, in the hope of getting something really valuable, and amassing information which can be used, only to have the edifice which had been beautifully pictured in mind, crumble to pieces because the doctor does not put down what he thinks he finds.

Another thing, from a physician's standpoint, that I would like to emphasize, is that if we can get the doctors to put down what they think they find, it will very largely help to solve the medical education of the doctor in diagnosing tuberculosis. Nothing teaches us quite so much as to be able to put down and record our findings and then go to the autopsy table and find out how mistaken we were.

And so, if standards can be worked out along these lines it will have a very important bearing upon the correct and early diagnosis of tuberculosis.

On the question of relief — and I am in the presence of some who very beautifully and very delightfully worsted me a number of years ago on the subject of relief — I think that this is a problem which should be very carefully watched. I am in thorough accord with the idea of doing as little relief as is possible, although the functions of relief may be utilized in the very small communities. Social agencies do not know how to draw the line at relief in some places and it is often difficult to draw the line. If standards are adopted with reference to this particular point, they should be formulated with an idea of doing as little relief as is absolutely necessary in order to get things done. Of course, it depends very largely on what the charitable organizations are doing in the particular community. It would be beside the mark to say that in a county where there are few people and widely distributed the tuberculosis visiting nurse should not give any kind of relief. Sometimes she must function as a united charities.

On the other hand, in the highly organized community of 100,000 people, or more, it would be impossible for her to do it and do it correctly. And so, we must work out those minimum standards so that they will be applicable to the people in the smaller communities, and the smaller communities, very much like the school problem, are the ones upon which we should direct and concentrate our attention. There are so many different problems, so many different viewpoints, the peculiar mentality of people who are living in small communities and closely in contact with one another — it is so entirely different from the metropolitan's viewpoint.

In the rural communities it is important only that you be honest. The metropolis demands that you be *efficient* as well as honest.

In the small community everything is somebody's else business, everything is a matter of gossip. The importance of a subject is in direct pro-

portion as it affords a topic of conversation during the interim of hanging out the wash or getting the meals. And so those things are important to consider.

One other word and I am through. Certainly we should very carefully, very painstakingly give encouragement by disseminating information relative to these standards throughout the country. There are so many people who do not quite understand and it does seem to me that with such a rudder in the hands of nurses in the smaller communities, they would much better steer their course. It means so much to the nurse or the doctor who is really earnestly interested and who has a good intention at the beginning, and he will be able to pave his way in a region where good intentions are not supposed to go, if he has some authoritative utterance relative to a minimum standard.

Dr. Borden Veeder, St. Louis: I want to limit my discussion purely to the question of the financial standards, although this was not touched upon in Miss Crowell's paper, but it is a phase that has been of particular importance to us in St. Louis, because of the tremendous objection to the development of the dispensary in many of the Middle Western cities. The particular problem we had to solve was this. In the reorganization of the Washington University school three clinics were combined and moved to a distant part of the city where we built a large dispensary building, expecting to have, say, twenty or thirty thousand visits a year and in the first year — it has only been open about eighteen months — we had 125,000 visits.

We attempted to find out what patients were suitable, or considered suitable by other dispensaries, for treatment in a free dispensary. In Cleveland, from one of the large dispensaries they quoted a figure that a normal family, that is, a man, wife and three children of school age, with an income of under fifty dollars a month, were entitled to free treatment; over fifty dollars a month, such a family should pay for their medical services. In another city, for exactly the same size of a family, a figure of one hundred dollars a month was quoted. Obviously, both of these figures could not be correct, as there is not one hundred per cent's difference in the cost of living.

A study of the general dispensary conditions throughout the country showed that there were no definite financial standards, and as a part of our work we attempted to work out, as far as possible, an economic basis, below which a patient is entitled to free medical treatment. This figure is based upon the cost of living, and the cost of living in relation to the income. There are a good many variable factors but those are probably the two chief factors. Of course, we have to take as a standard what a family can live upon efficiently, as regards housing, food, etc.

In going over the literature we found that the majority of the statements made, as to the cost of living, were estimates of social service workers and the figures cannot be correct as they vary tremendously. We were able to find two or three government reports in which the cost of living for unskilled laborers, that is, the actual cost of living, was

studied and published. From these figures we deducted the amount that was spent upon health, because we were taking into consideration, or intending to give these people free treatment, and naturally we could not say that the family was allowed a certain amount for health, and then give them free treatment.

The figure that we finally came to was basically that the cost of a normal family of a man and wife and three children under school age was about $800.00 that is, the figure for New York after deducting the amount for the difference of the cost of living and housing in St. Louis. That is the absolute cost upon which a normal family can live efficiently. You can, by deducting the amount for clothing, food, and extra rooms for children of different ages, obtain the cost of living for families of different sizes.

But the other problem that comes in is the question of how much a man earns, and in this you have to take the question of unemployment into consideration. If a person is working steadily or getting a salary whether he works or not, it is an entirely different matter than when he is without pay, for as soon as a person is laid off or becomes sick, the income decreases. A number of studies upon unemployment have been made. Probably the best of these is the one made by Prof. Nearing. He came to a figure of twenty per cent. unemployment; so when we are treating a person or a family in which the person working is in a trade or occupation with the average amount of unemployment, we have to add considerable to the figure of $800.00. In this way we reached the basic figure or figures which we have used. These are as follows:

	Employment with average unemployment		Steady income	
	Week	Month	Week	Month
Single man	$11.00		$9.50	
Single woman	10.00		8.75	
Man and wife	$12.00–13.00	$55.–60.		$54. $50.
Man and wife, 1 child under 14	14.00–15.00	60.–65.		50. 55.
Man and wife, 2 children under 14	16.00–17.00	70.–75.		60. 65.
Man and wife, 3 children under 14	18.00–19.00	75.–85.		65. 70.
Man and wife, 4 children under 14	20.00–22.00	85.–95.		72. 77.
Man and wife, 5 children under 14	23.00–25.00	100.00		85.

Dr. Karl Schäffle, Harrisburg: Miss Crowell's paper is very timely, as it would be highly advantageous if the work of tuberculosis dispensaries throughout the United States were standardized. The number of dispensaries in this study, 116, just happens to be the same as that of the dispensaries operated by the Pennsylvania Department of Health. These were standardized at their inauguration in 1907 by a session of the physicians in charge and the standards raised at that time have been maintained and improved by means of bulletins, letters of instruction and the visits of inspectors. Inspections of dispensaries are made constantly by two nurses and two physicians. The inspecting nurses are in charge of the 126 dispensary nurses and, in addition to observing their work in the dispensaries, accompany them on their rounds of the patients' homes. The physicians, who inspect the dispensaries, note the condition of the

State property, all dispensary records, the appearance and demeanor of the physicians and nurses and chiefly their methods of procedure and the spirit displayed in the performance of their duties. Of course the physician's diagnostic skill and his personal interest in the patients are most important but we also note carefully how they interpret the word "indigent" in their respective communities and the amount of cooperation shown by the neighboring practitioners and social agencies. Our chief material aid has been the issue of milk and olive oil as supplemental food to those who are unable to buy it. From July 1, 1907, until January 1, 1916, 8,056,861½ quarts of milk were issued to patients who were found to be deserving. Oil was served to 131,251 patients. Tuberculin was administered to 7,796. During this time the dispensary nurses made 973,259 visits upon the 87,418 patients who were admitted, 18,359 of whom were transferred to sanatoria, 2,487 referred to private physicians as non-indigent and 6,691 discharged as "cured" or "arrested."

From the beginning, the housing conditions were carefully reported and found to be as bad in the country as in the city. In the excellent addresses of last evening rural housing happened to receive no consideration. Although conditions among our rural population are not as bad as those reported by Professor Jacobs, of Berlin, or Dr. Bush, of Weisbaden, who found the mortality from tuberculosis in the country equal to that of the city because of inferior housing, we do find overcrowding, many windows nailed shut, feather pillows stuffed into broken panes, leaking roofs and most primitive methods of obtaining water supply and providing for the disposal of wastes. Since the Bureau of Housing was established as a division of the State Department of Health that portion of the nurses' reports dealing with this subject has been referred to the chief of the bureau who attends to its adjustment with the property owner.

A means of standardization which we have found to be invaluable is our "follow-up" system. By editing the reports of visits to former dispensary and sanatorium patients we are enabled to learn the results of treatment and thus compare the work of our physicians, also to note the nurses' thoroughness in their summaries of old cases and, most important, by the tabulation of the data obtained to have a scale by which the efficiency of the entire organization may be measured.

Dr. Philip K. Brown, San Francisco: I would like to ask Miss Crowell a question. We have unfortunately the trouble that all our nurses must be Civil Service appointees. There is no special examination for such nurses. I would like to know whether you get a better class by special examination? We have found it difficult to get the Civil Service Board to consider any form of special examination for this public health nursing and we would like some advice from you about that. Do you recommend the municipal control of clinics in preference to the clinics established in connection with the hospitals? Is the separation of the tuberculosis clinics from general medical clinics, in your experience as you studied

them in New York and elsewhere, a more effective means of handling the disease?

Our criticism of it has been that there are so many accompanying disease conditions with the tuberculosis, notably in children, the tonsilary disturbances, ear troubles, etc., that we have felt that we were at a very great disadvantage where the clinics were dissociated from general clinics. We have found that about twenty per cent. of working girls admitted with early tuberculosis to a small sanatorium had to undergo some surgical procedure before we felt in a position to take them in. Most of these conditions would not have been considered in a clinic for tuberculosis.

Things were expedited very decidedly in operating our admitting clinic in connection with a general clinic. As I have seen tuberculosis clinics around the country it seems to me the most important thing in the world is what has been covered by Miss Crowell's paper and I think we have got to realize that what happens to the patient twenty-three hours and fifty odd minutes of each day when they are not under the personal supervision of the examining doctor is the most important thing in the world in connection with the handling of tuberculosis. So much can happen in a wrong two hours of effort on the part of the patient that six weeks or six months of labor is often necessary to get him back into good shape again, and if we could only convince these tuberculosis organizations throughout the country that there is a standard method of handling a case of coordinating those forces that should be brought together to operate upon the case to the end that the patient may be kept moving at a rate that you decide is desirable and in the direction you want the patient to go, then we will get somewhere.

At present the effort is so absolutely disintegrated in a way, that the doctors all feel the clinic is a great thing and we can treat tuberculosis out of existence, which, of course, we certainly cannot do. It is a very great satisfaction to me that Miss Crowell's report is going to be distributed by the National Association. I only wish that the National Association would refuse to admit any of the local associations unless every member was obliged to pass an examination on that report to the end that they might start the clinic work with the essential forces connected up with it to make that work worth while.

Dr. Clarence L. Wheaton, Chicago: I wish to say in discussing this subject that I will endeavor not to encroach upon the field of Dr. Ritter, as we are doing identically the same dispensary work with the Chicago Municipal Tuberculosis Sanatorium. I was very much interested in the paper presented by Miss Crowell. Not many years ago, when a consumptive appeared at the dispensary, it was customary to supply him with cod liver oil or other medicine, feeling, however, that little could be accomplished. We knew absolutely nothing regarding home conditions, we did not know whether there were any sick children in the home, or possibly the wife, physically incapacitated by the same disease now afflicting the husband. So far as housing conditions were concerned we

knew absolutely nothing and manifested little interest. But now, however, the situation has changed.

When these people come to the dispensaries, we elicit a careful clinical and social history. The chain of dispensaries established in Chicago is a part of the Chicago Municipal Tuberculosis Sanitarium; we cooperate with all regularly organized charities and social forces, and are enabled to give these people whom we have diagnosed as tuberculous substantial relief, such as supplying them with food, fuel and other necessities, to say nothing of the educational propaganda brought to the home. The social side of the problem is in no way overlooked.

As this discussion is limited to five minutes, with your permission I will read a few lines pertaining to the subject covered in this paper:

In the solution of this great economic problem — the control of tuberculosis in our cities, the dispensary is without doubt a factor of the greatest importance. In the districts served it is not only a center for medical service but social as well, controlling in infinite detail the many cases of tuberculosis seeking relief. The relieving of distress among tuberculous patients incident to long illness and subsequent poverty, through the many charities with which a dispensary may be affiliated, brings to the patient confidence in our ability to render substantial aid.

The chain of dispensaries of the Municipal Tuberculosis Sanatorium in the city of Chicago, is the only gateway to the sanatorium and the dispensary is the center of social service; every case registered, whether bedridden or ambulatory, is under social as well as medical care. This continues just so long as there is cooperation on the part of the patient. To appreciably reduce the mortality statistics in tuberculosis, especially in large cities, our efforts must be largely along lines of prevention. The relation of the municipal infirmary to the chain of dispensaries is close.

An infirmary of one thousand beds in a city of one million population would in all probability be inadequate to completely evacuate those dispensaries controlling innumerable cases of open tuberculosis, cases affecting entire families that should be removed from the home and isolated in the infirmary. We have failed in our full measure of responsibility when no provision is made for the care of those who through our diagnosis have lost their position as wage-earners. We can, without difficulty, eliminate the tuberculous wage-earner from his special field of endeavor, but in our failure to provide for his care we have accomplished absolutely nothing from an economic or sanitary standpoint.

Cooperating with the municipal infirmary, the value of the municipal tuberculosis dispensary is apparent; with its staff of nurses and physicians, both in the field and on the premises, with its affiliation with regular organized charities, with social workers in all fields, with the control of the patient at home and in the dispensary, with its educational propaganda it would seem that the dispensary is not only essential but absolutely indispensable to the solution of the tuberculosis problem in all municipalities.

Miss Crowell: I think the answer to Dr. Brown's second question rela-

tive to the value of the tuberculosis clinic which is a part of a general dispensary versus the special dispensary treating only tuberculosis depends entirely upon individual circumstances.

In New York City we have twenty-eight tuberculosis clinics. Eighteen of these are specialized institutions, ten are a part of general dispensaries. The relative merit of any one clinic contrasted with a clinic of the opposite type must be decided by the particular circumstances and conditions of work in each clinic. I know of general hospital dispensaries which are maintaining special tuberculosis clinics and which are doing very much better work than certain specialized tuberculosis dispensaries and vice versa. I do not think any hard and fast dictum can be laid down in this matter.

As regards Dr. Brown's first question, I am going to ask Mr. Stone to let my chief, Mr. Veiller, answer that. While he has taught me all I know, he has not taught me all that he knows, and he has had a good deal of experience in civil service matters.

Lawrence Veiller, New York: In the first place, I am going to disclaim any responsibility for having taught Miss Crowell "all she knows." I will answer Dr. Brown's question, if I may, very briefly. The answer is that it depends very largely upon the *kind* of civil service you have. I think everybody agrees that you get a poorer nurse under civil service than you do under private control. That is hardly a debatable question. On the other hand, as to whether you get from the civil service as good a worker as you did in the old days when everything was left to political appointment, I do not think there is doubt in the minds of any one. We do not want any more the washerwoman and scrublady as nurse in our tuberculosis dispensaries. That is the type we usually got when appointments were under political control. It all comes down to a question of the efficiency and practical character of the civil service examinations. You all know the story of the colored man who was being examined in an oral examination for the position of letter carrier in the Federal service, and was asked this question: "How long will it take a ray of light to travel from the sun to the earth?" He scratched his head and said, "Golly, boss, if you're going to give me dat route I don't want the job!"

PAY CLINICS FOR TUBERCULOSIS

By Michael M. Davis, Jr., Ph.D.
Boston

The paper of Miss Crowell's and the remarks in discussion of it have been an excellent introduction to what I have to say on this subject. We have already had laid before us the importance of clinics; something of clinical standards and something of the social basis.

No one can look over the history of the tuberculosis movement without being struck by the part that clinics have played. Now, a pay clinic is merely a special form of the general type which we have been discussing this morning. I will try to define what I mean by a pay clinic and why it seems to me that we need to have pay clinics in our general scheme of health work, of which tuberculosis work is only one phase.

By pay clinic I mean first of all a clinic where the patients pay a fee bearing a relation to the cost of running the clinic, the aim being to make the clinic self-supporting. Many dispensaries, either general or special, charge fees for admission, treatment, or for medicines or x-rays. These fees are usually nominal in amount — ten cents for example, and are determined without respect to the value of the service. In the second place, in the ordinary clinic the physician is not paid. By pay clinic I mean a clinic where the patient pays a fee bearing a relation to the cost of the service and where the physician is paid a salary which also must bear some relation to the practical value of his services and be what he thinks is a fair remuneration, considering the interest of the clinic and the prestige, if any, of the appointment.

The principle of payment by patients is a principle which has been discussed considerably already; but I do not think in relation to tuberculosis. The reasons why the principle is important seem to me to be these: that putting a clinic on a paying, business basis is likely to enhance its service to public health and also its administrative efficiency. A large proportion of our general clinics in this country, and to some extent the tuberculosis clinics, have been founded as a means of doing charity, medical charity or general charity. Many clinics have also sprung from, or been largely assisted by, the purpose of amassing medical material for purposes of teaching and study. The desire to serve the public health is still another source from which have sprung many clinics, and probably a large majority of the special tuberculosis clinics. The pay clinic must be founded, if it is not merely commercial, upon the public health principle. We have a certain job to do, for every community that needs that kind of job done. We ask what means, what bits of machinery, will get that

job done. The pay clinic, for the reasons that I am trying to indicate, is one such piece of machinery.

First, let me say a word on the actual development of the pay clinic idea in practice. The first pay clinic, so far as I know, was started about three years ago at the Boston Dispensary and we have developed there thus far three special pay clinics, one for eye diseases, one for genito-urinary diseases, the third for syphilis, and in the very near future, that is in the next three or four months, we shall undertake a more ambitious scheme, namely a pay clinic for general diseases (including tuberculosis) and certain other specialties, like a throat clinic and a dental clinic.

The movement has been taken up by the Brooklyn Hospital — it is under consideration now in New York, at Mount Sinai Hospital; and also in Cleveland and in some other places that I cannot now mention. The movement has naturally attracted criticism, as Dr. Veeder has suggested it would. Let me point out here that in what Dr. Veeder had to say on the financial side of the relation between the clinic and the patient, only two factors were brought out: (1) the circumstances of the patient (the patient's income) and (2) the cost of living. There is a third factor of equal importance, namely, the cost of the medical service required. Personally, I fail to see how it is possible to consider the question of a financial standard for admission to clinics unless we take into account all those three factors: (1) the income of the patient or of his family, (2) the standards of living, and (3) the cost of the medical service required at the time the patient applies for admission.

Now this cost of medical service varies very widely. A patient comes in, or a child is brought in by a school nurse, with a need for eye-glasses; the examination by an oculist would cost, on a private basis, somewhere between five and ten dollars. Another patient is brought in with some minor trouble which in private practice would call for a couple of visits and would cost anywhere from three to five dollars for the medical care.

On the other hand, you may have a woman patient with a trouble requiring a surgical operation in the hospital and a long period of after-care, with perhaps follow-up dispensary care for months. Such a case would cost hundreds of dollars under private treatment. You may face a case of acute gonorrhea, the proper treatment of which in private practice will cost anywhere from a hundred to two hundred dollars in the course of a year. These wide contrasts could be extended indefinitely. Suppose we picked ten sick people at random out of the community, paying no attention to "social classes." To provide adequate medical care for their needs might cost $5 in the case of one and $500 in the case of another of the ten, and perhaps the man who had only the $5 purse might have the $500 disease! At any rate, the cost of adequate medical care would often be far beyond the patient's means, even the means of people who never think of coming to dispensaries.

Now, the public can be divided into three groups from this standpoint. First, those who can pay anything for what they need, the rich; second,

those who can pay nothing, or practically nothing, the poor; and third; those who can pay something, who are most of us. Those who can and will pay something are by far the largest class in the community, and how big that class is, and how big the "something" that they can pay, is the important question. But it cannot be answered offhand, nor can it be answered in general terms, for the problem has too many elements in it; number of people, ages, occupation, income, medical needs, cost of medical service and institutional resources of the community — all have to be studied.

Those who can pay something for medical service but who cannot meet any serious emergency, or any long-continued drain, are the class in the community, who at the present day, get the poorest medical service on the whole. In communities where hospital and dispensary service have been well developed the poor are provided for, largely through the same physicians who serve the rich. But the middle group of the community is not and should not be reached by the ordinary clinic; and to meet the need of this middle group is the function, if there is a function, for the pay clinic.

To come down to a few details; The pay clinics that we have started, charge rates which vary somewhat with the nature of the service. An eye service, for example, is, as a rule, a short-time service for each patient. The average case takes only two or three visits. Hence we charge higher rates, in order to cover cost, than in a service for a long-term disease like gonorrhea, where we charge fifty cents a visit. It has been proven by over two years' experience in these clinics that what the patients pay is little if any more than what the medicines or supplies alone would cost at commercial prices. Yet the clinics meet running expenses and are paying doctors several thousand dollars, that otherwise would not go to the medical profession at all.

In a general clinic which we have in mind now, and which we will start in the near future, we shall charge an admission fee of probably fifty cents; plus extra fees which will be determined by the nature of the work to be done. I might say at this point that I thoroughly believe in the principle of a central general clinic rather than a group of unconnected specialized clinics. I bring this in because tuberculosis, from our point of view, is a specialized service. I believe that the ideal way of organizing either a pay or a free clinic is to have a general service with good medical and surgical diagnosticians supplemented by a group of special clinics covering the different regions of our mortal frame. But in that scheme tuberculosis fits in most closely of course, with our general clinic. I have not in mind at the present moment starting a special pay clinic for tuberculosis but rather to make it a division of the general medical service, the main point being to have a service that is especially interested in the problem. Whether you call it a special clinic or a division of another clinic is a matter of organization; whether or not you have a physician who is especially interested in the tuberculosis problem is a matter of the first importance from the standpoint of efficiency. The pay clinic for

tuberculosis, therefore, comes into the particular proposition that I am presenting merely as one incident, though an important one.

Now I must say a word of the relation between the pay clinic and private medical practice. There has been thus far little private opposition to pay clinic in Boston, and no organized opposition at all. In New York, however, there has recently been a good deal of active opposition to the proposal of Mount Sinai Hospital for pay clinics on a large scale. It seems to me that the matter must be approached from the standpoint of public health. I am quite convinced that if the medical profession or its leading representatives can be shown that a certain step is needed for the benefit of the community, the leaders of the medical profession will endorse that step; and if the leaders of the medical profession will endorse it the rest will follow.

The step can be taken; it will be taken; and I am convinced furthermore that it is not at all impossible to convince a group of medical men who have the interests of the public at heart that a step which seems in some of its relationships to be antagonistic to the financial welfare of some members of the profession, is nevertheless desirable and necessary. I believe it can be shown concretely, by taking up a series of actual cases, that there are a large number of persons in the community who are actually able to pay for the service of general physicians for certain minor troubles, but who are wholly unable to meet the cost of cases of tuberculosis in their families, or the cost of a serious disease of some other kind.

If that can be shown, there are only two answers: first, let us ask individual physicians to take these cases for what they can pay. I am often told "Why, any man will take a case if you will call him up and tell him the circumstances, and he will treat that case for nothing or for whatever the patient can pay." And so he will, if you have a small number of such cases. But if you call a physician up three or five times a week and ask him to take cases which will encroach upon his working time, and will mingle in with his private patients, you will soon have a reaction that is not so favorable. It is not a question of a physician's willingness to serve the sick; it is a question of organizing his work so as not to expect the impossible or mingle the incompatible.

I think it unfair to the medical profession to expect that they should give service to the pay clinic without being compensated. Of course compensation should be made. This is necessary also, from the standpoint of efficiency. Payment is also coming to be considered seriously in many general clinics, especially where there is not a large teaching service. The pay clinic will have a desirable reaction, I believe, upon our general dispensary service. We suffer in many dispensaries from the evil of overcrowding; of letting in too many patients per physician. We suffer from inadequate dispensary organization, leading to slipshod work in various ways. The pay clinic makes an unanswerable demand for efficiency because it will be on a business basis. If patients pay the total or approximate cost of the service, they expect adequate service.

If the physician is paid for his work, and if the managers know they are putting out money for his salary and are getting the money from the patients they will feel a serious responsibility to give a return in results — a responsibility that is often too lightly taken in "free" dispensaries. I think, therefore, that there will be a very desirable reaction of the pay clinic upon the efficiency of dispensary clinics in general, by stimulating organization, and by promoting efficient methods. That is one reason why I started pay clinics, because of my interest in all forms of dispensary work. Pay clinics, as a form of efficiently organized medical service, should also be of value in the development of the medical service under health insurance, to which many signs point as an approaching movement in this country.

But another question arises. Why do we not place the treatment of a prevalent infectious disease like tuberculosis under public auspices and have the same obligation placed on municipalities or States, to establish dispensaries under municipal auspices, open free to all people; as we do for public schools. Why have pay clinics when we may, and many cities do, invite everybody to free public tuberculosis clinics? The answer is that the public isn't ready for free health. We do not find that every one sends his children to the public schools; not as much as we should like. People will go or will send the children much less universally to dispensaries, because until we have much higher dispensary standards and much better public comprehension of them, than we have to-day, there are large classes in the community who will not go to any public free dispensary. I do not believe that it will be possible for a considerable time, to create either an attitude toward the dispensary in the minds of the general public or a situation in the dispensary itself that will draw to it the middle classes of the community.

I wish to close by pointing out one great and indeed supreme advantage of the clinic as over against private practice, in dealing with infectious diseases. The clinic can be militant; it can go out after the business. Successful anti-tuberculosis work means going after the business; getting cases of actual or possible tuberculosis to the doctor early and often.

Now, suppose you have a doctor who is willing to do any amount of private work freely. Let us take a theoretical case, not wholly theoretical; suppose a man of independent means who is willing to give any amount of time to free work in his private office; the trouble is that he cannot advertise ethically from the medical standpoint, and you or I cannot advertise for him. You cannot make his offer known to the people who need it. You have to get hold of them in some odd way, and that usually means when the tuberculosis is in an advanced stage. If the pay clinic meant nothing more than taking a good doctor and advertising him on an ethical basis, it would mean a great deal. The pay clinic is a necessity in proportion as we are laying before ourselves the ultimate test of all public health work, the hundred per cent. test. Our criterion must be not merely what results are we getting for the people who have come to us for this disease. Rather must we ask what pro-

portion are we reaching of *all the cases in this community* that have this disease. The pay clinic should make possible effective, militant, anti-tuberculosis work among the middle classes, as the free clinic has for those at or near the poverty line. Pay clinics seem to me to open a way to reach that class in the community which is least adequately served today. Shall we not take up and test out, this new means of promoting the public health?

DISCUSSION ON PAPER BY MR. DAVIS

Dr. Donald B. Armstrong, New York: In Dr. Davis' most interesting and instructive presentation of the pay clinic proposition, I am especially impressed by the emphasis which he places upon the provision of a service which shall meet the medical needs of the great self-supporting group in the community. As Dr. Davis knows, we have been very much interested in a special phase of this subject in New York City and hope to be able to utilize with profit, along a somewhat different line, the most valuable pioneer pay clinic work demonstrated at the Boston Dispensary.

In New York, we have been considering for some months the possibility of establishing a self-supporting clinic in cooperation with one of the more highly developed community centers in connection with the public school system. Plans for such a clinic have passed the preliminary stages, and an effort is now being made to work out a satisfactory method of financing. The requirements of this proposed clinic are as follows:

1. The establishment of the project as a non-profit-making membership corporation.
2. The opening of an evening clinic at first, where moderate fees could be charged, and where the professional service would be paid and would be of a high type.
3. The establishment in connection with the clinic of home nursing service and of social service follow-up work.
4. The carrying out of a general health education program including a prenatal clinic, an infant consultation station and the establishment of a system of routine physical examinations for adults.

It is hoped at the start to include in the service the following branches: General medical, minor surgical, eye refraction and dental. It is estimated that a budget of $20,000 a year would provide expert professional service, would pay for rent, light, etc., and would cover initial equipment and such educational work as is planned. This takes into account simply expenditures; if the plant were at all a success, the receipts ought eventually to make the clinic self-supporting.

Such a plan differs from the work organized by Dr. Davis mainly in that it is not established in connection with any existing medical institution; it is an attempt to use for educational and other purposes the existing mechanism of the community center movement. Like the sug-

gestions made by Dr. Davis in his present paper, it would meet, in so far as its capacity allowed, the tuberculosis problem of the neighborhood, mainly, of course, through the general medical service.

I would like to say a word also about another matter which Dr. Davis has not especially emphasized to-day, but which he has discussed on numerous other occasions and for which he is largely responsible, namely, the movement for dispensary efficiency. A program for dispensary improvement along this line must include the problems of equipment, methods and technique, record keeping, social service follow-up, and the prevention of dispensary exploitation. With the assistance of Dr. Davis we have attempted to do something along the line of improvement in the venereal disease dispensaries in New York City, especially in the realm of record keeping. More pertinent to this program to-day, however, is a study recently completed by the New York Association for Improving the Condition of the Poor of one hundred of our tuberculosis families, by which we attempted to ascertain the results accomplished through relief home care, supplemented by such private physician, dispensary, sanatorium and hospital facilities as are available.

I do not want to take up your time with the results of this study just now, for as a matter of fact our figures are still incomplete. So far as they have any bearing, however, upon the dispensary problem, in indicating the necessity for more efficient dispensary service as well as improved medical service for tuberculosis in general, a few figures, based on 624 individuals in these families, 166 or 26.6 per cent. of whom were tuberculous, may be of some interest.

We found, for instance, that in 25 per cent. of the cases the patient consulted a private physician before going to the public dispensary. Several of these received more or less queer treatment from the private doctors, one gave creosote, another electricity, another refused to tell the patient the nature of the disease and several prescribed general tonics but failed to advise the family in the matter of general precautions to prevent infection. Out of the total number of cases coming in contact with dispensaries in New York City, 31 per cent. failed to show any record of follow-up work on the part of the dispensary organization. It is not strange, therefore, that our investigators found it necessary to record that 35 per cent. of the cases failed almost entirely to follow advice and direction. Figures of this kind, and the results which they imply in morbidity and mortality are strong evidence in favor not only of existing dispensary improvement but indeed of any modification of the dispensary system which shall increase responsibility and efficiency. I firmly believe that the method that is going to prove successful in meeting this problem is the self-supporting pay clinic.

Dr. William Charles White, Pittsburgh: This is a difficult subject to speak on. A very keen man has undertaken to solve it and I know not where it will lead him. Of course, one of the great evils between patient and doctor is money. Part of the doctor's idea is to get as well paid as possible. The patient's idea is usually to get the best serv-

ice he can for the least money. The burden comes, in the majority of cases, on those who are the backbone of the country — the self-respecting wage-earning groups including artisans, clerks, telephone operators and those in various forms of office service, often with families to support, to whom the best should be given at a price which they can afford.

As it stands to-day, however, they usually fall below the poverty line when they attempt to meet the demand of the modern medical practice provided in their living districts. With the great stimulus of self-respect behind them, they try to meet the demands of the doctor and nurse and druggist and often get little in return in serious cases, but beginning years of debt and worry and trial and trouble, from which they never recover.

The doctor has his own side, however, he has been licensed by the State to earn his living from those who consult him, and when he sees a great social movement crowding him from every side, invading the fees that the State has charged him for before giving him the license to levy as a means of livelihood for himself and his family, of course, he feels keenly and shudders at the shrieks of the oncoming roller which will rob him of his living as State medicine and organized charity will surely do.

I do not know, as I say again, where it will end. The great question, I think, to be faced is — who is to decide what is to be paid for service rendered? Is it to be in the hands of the patient to determine how much he or she can afford to pay? This often would not be fairly done. Now usually the doctor, by adroit questions, finds out just about how much the patient is good for. In a pay clinic the nurse should determine on the basis of family budget by consultation what is right and fair for any family or patient to pay. The pay clinic as outlined by Mr. Davis does not do this, but puts a fixed price on the service. All this does is to lower the price and this will not help much. The pay clinic offers to give what it calls the best service at a low or bargain rate. The only solution will be the best service at what the family can afford without reducing it to the poverty line.

There is one thing that should stand first in a doctor's mind, and this is his patient's welfare; but this cannot always be, because, bigger than the patient often is the doctor's own family which he himself has to support. He is between two very serious problems — service and demand. This problem of the doctor's family must come into the settlement of the problem.

To go more into detail, one cannot say fifty cents is to be the admission to a clinic and x-ray treatment will be so much, so much for treatment for gonorrhœa and so much for a skin disease. One cannot do it, because families cannot pay even so much; they can pay, however, a graduated scale from nothing upwards; and the basis upon which to put it is not what the thing is worth in coinage, but on what the family's budget will stand, and under no other conditions can pay clinics be run

successfully for the patient; it can never be a fifty cent admission process without refusing first aid to many working people. However, while these criticisms have to be offered, I am not sure of the way out at this time. Organized medicine has always been slow in its solution of the problems ahead of it. Organized medicine has as a basis, mind you, the necessity of supporting doctors' families just as charities have the necessity of supporting the families under their charge. The members of organized medicine range all the way from those that can charge fifty dollars for an office visit down to those who can charge very little — fifty cents or twenty-five cents; one man who may sell his office visits for twenty-five dollars will go around the corner and sell the same thing for nothing, in a free clinic; perhaps, if he be attached to one of Dr. Davis's pay clinics — mind, I am not opposed to it in any way — he will sell the same thing for fifty cents. He may easily go to three parts of the same city and put three different values on the same commodity in the same community, ranging from nothing, possibly, to twenty-five dollars. There is nothing wrong in this except that it reduces the value of the thing that is sold and one can scarcely sell the same thing in three different places down to a free gift of it without being discovered.

Fundamentally, the whole thing must be put upon another basis; the sale of the best thing that you can give in the way of human health and care at what the family can afford and there must be in the minds of those who are caring for the public, the provision of uniformly good service to every individual who seeks health.

Uniform care of the public health from the Atlantic to the Pacific, giving exactly the same care to all grades of people, whether by the grace of God, they have the brains and intelligence to earn enough money to pay for the best or not. Only when we come to a realization of this, I believe, will we have worked out the interesting problem which Mr. Davis has presented to us.

Dr. Borden Veeder, St. Louis: I wanted to make the point, but probably did not express it clearly, that we were simply trying to make a minimum line below which every patient was entitled to free treatment, above that line any number of conditions enter in.

As regards this question of pay clinics. We have gone into it in considerable detail in St. Louis. There are only a few basic factors which furnish any reason for the pay clinic. One is that the cost of adequate medical treatment is beyond what an individual can pay for; the other is that the treatment that a person gets from a private physician is not competent. When you fundamentally consider the second, that is, the person not obtaining from the private physician adequate or proper treatment, it goes back to medical education, and this entire problem is a problem of medical education, as much a problem of education as it is of economics and of the cost of treatment.

In the last ten years the number of medical schools in this country have been reduced some forty per cent. There are only half as many medical students to-day as there were ten years ago, but we are to-day

suffering from the over production of poorly trained men who are licensed to practice medicine, whom one can hardly call physicians. On the other side, is it possible for the private physician to give proper treatment? As a matter of fact, 75 per cent. of the people who go to physicians do not need a physician's services. It is really only comparatively few people who need the care and advice of a physician. If you have well trained physicians, they can treat by far the majority of the cases that go to them. Mr. Davis brings out the point that he is establishing a clinic for the treatment of gonorrhea. Acute gonorrhea is a condition that can be treated by the private physician. I do not believe that there is any necessity of a man having to go to a clinic to get adequate treatment or treatment at a reasonable price for this disease. But there are certain conditions, as for example, where a person comes with an obscure condition which requires an examination, say by a skilled neurologist, a skilled ophthalmologist, etc., and he is unable to pay for the service of all these specialists.

We will have to come to some sort of an arrangement of a group of men or clinic to treat conditions of this character, so that a person can get adequate treatment at a price that he can pay for, but I doubt if the pay clinic, as outlined, is the solution.

I have come to the belief that the only solution of this whole problem is that of health insurance. Health is such a matter of vital importance to the public at large that we cannot leave the health of the individual to the individual himself. We have got to force health, you might say, upon the community, and we can only do that if we have some form of insurance which everybody is forced into, not only the man with an income under $800 a year or $1,200 a year. You have got to have a universal health insurance, and I believe that it is rapidly coming, and it seems to me that this development of the pay clinic for individual disease is something that is going to work against it.

If we go on logically with the pay clinics, we will have groups of men getting together, advertising and announcing themselves as specialists, or as treating together in a group, and it will result in the development of groups which will have absolutely no connection with an organization. The first thing you know we will have the same troubles and problems with these groups as we have with individual physicians to-day who are not properly trained. I doubt very much whether the pay clinic is the solution of our medical problems. There may be some reason for a pay clinic on a group basis, but I do not think there is any need for a pay clinic for individual diseases, or an eye clinic such as you are establishing.

COLORED PHYSICIANS AND COLORED NURSES FOR COLORED PATIENTS

By H. R. M. Landis, M.D.

Philadelphia

In dealing with the tuberculosis problem among the negroes greater difficulties are encountered than among those of the white race. It is well known that in his native state the negro was free from tuberculosis and that this was true also prior to his liberation. In common with other infectious diseases tuberculosis is especially prone to become widespread among those who lack an acquired immunity. Inasmuch as the negro has been exposed to tuberculosis a little over fifty years the disease cannot be considered other than a most recent infection. The negro is therefore lacking in the partial immunity possessed by certain other races in which tuberculosis has existed for centuries.

The susceptibility to infection and the high incidence of the disease among negroes have been matters of serious concern in the Southern States for years. In the North there are very few who realize that there is a negro problem, largely because the negro is not of so much importance industrially in the North as he is in the South.

It matters not, however, whether we are actuated by sentiment to aid a race struggling under difficulties or whether we view the problem as a public health measure. The essential things to bear in mind are:— that in many of our Northern cities the colored population is large; that tuberculosis is widespread among this race; and that the white population cannot ignore the menace this widespread infection carries.

The problem undoubtedly presents serious difficulties. The great susceptibility to infection, the unsanitary condition under which a large portion of the race lives, low wages, a lack of diversity in employment, improvidence, and above all, the reluctance of the negro to seek medical advice, all point to the necessity of intensive educational work which must be more than ordinarily persistent.

A brief account of the work now being done in Philadelphia may be of interest. Philadelphia has one of the largest urban negro populations in the country, being estimated in 1914 at 93,000. The general death rate in 1914 was 15.72 per 1,000 for the white and 25.02 per 1,000 for the negro. The death rate from tuberculosis of the lungs, in 1914, was 430.98 per 100,000 among the negroes as against 146.15 per 100,000 among the white population. Nor does this give a correct idea as to the morbidity rate, as many, when they find themselves ill, return to their former homes in the South.

Generally speaking nothing was being done towards reaching this popu-

lation directly, and although it is true that the various hospitals and dispensaries were open to negroes, they rarely applied for aid. Educational measures designed for the general public also had little or no effect. General invitations, too often, do not include them, and when perchance they do, the negroes generally feel that the invitation is not given in good faith.

About three years ago I became identified with the Whittier Center, an organization devoted to the interests of the negroes. At my suggestion this organization adopted the policy of concentrating its effort on a study of the health conditions among the negroes, giving especial attention to tuberculosis. The question then arose as how best to attack the problem.

My own feelings in the matter were that if any advance was to be made it must be through and by the negroes themselves. They must be taught self-reliance and must be shown the necessity of meeting their difficulties through their own efforts. Working on this theory, we determined to employ a colored nurse. There was much to recommend this. In the first place, a colored nurse can more easily gain access to the home than a white nurse; secondly, she can go with immunity, day or night, into districts in which it would not be safe for a white woman; and third and last, a greater degree of confidence is established among the colored people by one of their own race. Having determined on this policy, we began the work on February 1st, 1914.

We were extremely fortunate in obtaining the services of Mrs. Elizabeth Tyler, who was not only a graduate nurse but also a trained social worker. To her enthusiasm and intelligent grasp of the problem must be attributed much of our success.

How best to begin the attack was our chief concern. One nurse among 93,000 people did not look encouraging; still a beginning had to be made. The nurse began her work by a systematic house to house investigation in those blocks nearest the Phipps Institute, where there are a large number of colored residents. She had not gone far when she discovered that in many homes one or more persons were ill from one cause or another. Those suspected of having tuberculosis or a predisposition to the disease were urged to go to the Phipps Institute for treatment. Other cases were referred to the proper agencies. In this way she gradually worked her way along by means of a house to house canvass. Five months later (July 1st, 1914) the Pennsylvania Society for the Prevention of Tuberculosis became interested in the work and offered to furnish the services of a second nurse, Miss Clara Johnson. At the present time one nurse is doing educational work; one is doing general social service work among the dispensary patients; and a third, recently provided by the Pennsylvania Society for the Prevention of Tuberculosis, is to do the work of a visiting nurse.

In less than a year after the colored nurses had been at work the effect of their campaign became distinctly noticeable, as can be judged from the experience of the Phipps Institute. The Phipps Institute from the time it was founded has been located very close to a large portion of the negro

population and yet up until two years ago negro dispensary patients were very few. Furthermore, those who did come, as a rule, paid but one visit. As a result of the work done by the nurses more and more colored patients came to the Institute and what is still more important, they continued their visits. The number in attendance became sufficiently large to form a separate clinic, and this was put in charge of a colored physician, Dr. Henry Minton. At the present time there is an attendance of from 10 to 12 on each of the two days the clinic is held and the number is steadily increasing. It is furthermore of interest to note that several other tuberculosis dispensaries, namely, that connected with the Presbyterian Hospital and the Jefferson Hospital for Diseases of the Chest, have noticed the effect of the work. The latter institution has also placed a colored physician in charge of its colored dispensary patients.

A Committee on Health and Sanitation, of which Dr. Minton is the chairman, was organized about six months ago. This Committee is conducting educational meetings at churches and other gathering places. A very large number of people have been reached in this way during the last six months.

Mrs. Tyler also conducts a " Little Mothers " Class, composed of young girls in the neighborhood of the Phipps Institute. These children are taught the necessity of absolute cleanliness of the home and its surroundings. They are also taught how to care for small babies.

As a part of their routine work the nurses make a thorough examination of the sanitary conditions in and about the house. In those instances in which the unhygienic condition is the fault of the landlord the Board of Health is notified of the defect and an effort is made to correct it. As a result of their work a large number of unsanitary evils have been remedied.

If the fault lies with the tenant and is due to not observing the ordinary rules of hygiene, the nurse endeavors through instruction and frequent visits to teach the people the dangers of unsanitary habits.

I believe the work has passed the experimental stage and can be looked upon as the method of choice. It certainly has been successful with us and there is reason to believe that eventually others will take the same view of the problem.

The following report which was submitted to the Pennsylvania Society for the Prevention of Tuberculosis shows the amount of work accomplished during the past year:

Number of new dispensary patients	148
Number of these patients non-tuberculous	19
Number of dispensary patients visited	169
Number of other patients	38
Visits paid to dispensary patients	973
Visits paid to others	72
Total number of visits paid	1045
House to house investigations	312
Number of homes in which illness was found	59
Number of homes in which tuberculosis was found	38
Total number of homes visited	481
Number of patients to receive hospital care	27

Number to receive sanatorium care	10
Number to receive visiting nurse care	9
Number to die	25
Number to receive food, milk and eggs, clothing, etc.	31
Cases closed by death or other reasons	85

At the present time the nurses have an intimate knowledge of 900 families.

Two years ago a joint study of the housing condition of negroes, in several selected districts, was made by the Whittier Center and the Philadelphia Housing Commission. Largely as a result of this study the Whittier Center became interested in the building of model flats for negro tenants. To carry out this demonstration a housing company has been formed which is modeled along the lines of the Washington Sanitary Housing Association. The latter company has been in existence for a number of years, has steadily grown, and in addition to paying 5 per cent. on its investment, has accumulated a large surplus. Of the $25,000 needed to start the work in Philadelphia $9,000 has already been subscribed and, as yet, no general appeal to the public has been made. A lot has already been purchased and it is hoped that the houses will be completed by the autumn.

I have made this report rather brief but I think we have gone far enough to make it perfectly clear that the colored people are reached far more easily, that their interest is more firmly aroused and furthermore that they keep up their interest in the matter. Considering that with all the machinery that we had in operation we got no results, it is rather noticeable that, within six months from the time that the colored nurses went to work, the attendance at the dispensaries began to jump up to a very noticeable degree, so much so that we established a special clinic with a colored physician in charge.

DISCUSSION ON PAPER BY DR. LANDIS

Dr. John Ritter, Chicago: I have been very much interested in what Dr. Landis has said and I greatly appreciate that he has brought these particular points, concerning the colored race and tuberculosis, so clearly before us. In a large city like Chicago with a population of over 2,500,000 souls, we have quite a number of colored people and many are tuberculous. Here the white physician as well as the white nurse has a great duty to perform. There is in some quarters still a little antipathy between white and colored physicians and nurses working in this common field side by side. We have, as in every community where there is a large mixed population, many colored physicians and nurses and they ought to be encouraged to establish amongst their own people, special tuberculosis clinics, and it is our duty to so educate them that this can be done. In Chicago, having a large colored population and living chiefly in two large districts, one south and the other in the western part of the city, the establishing of colored clinics could easily be arranged. Dr. Landis stated that the colored man is a great deal more

prone to tuberculosis than is his brother the white man, and that is true. The white man has for ages been exposed to tuberculosis and has been immunizing himself over a long period of time while the colored man's tuberculous infection is comparatively recent and his efforts at immunization have just begun. I believe that in every large city, some effort ought to be made for the establishing of dispensaries and clinics which will enable the colored physician and nurse to take care of their own people and it is our duty as white physicians and nurses to take these people by the hand, lead them on and teach them how to take care of their own class. There are many colored physicians who are anxious to get into this work. I speak this as a fact for many have told me so. Let us teach and assist them in every way possible, so that they may be able thoroughly to perform this duty toward their fellowman.

Miss Rosa Lowe, Atlanta: In Atlanta for many years we carried on dispensary work for the negroes under the direction of the whites with the service of white doctors and nurses. Recently we have employed a negro nurse but have not had sufficient time yet, to determine her efficiency as compared with the white nurse. We believe, however, that she will be able to gain access to the hearts of her people better and more effectively than did the white nurse.

She is a graduate from the nursing department of Spellman University, a negro university located in Atlanta, and was chosen in preference to applicants from other cities because of the influence which her connection with this university would give to the anti-tuberculosis work among the negroes, and also because of the opportunity it would afford her of gaining new inspiration and advice from her Alma Mater.

A question of importance with us is, whether or not it will be wise to secure the services of a negro doctor for this work,— however we do not believe that this is the opportune time for such a step since the medical profession must be prepared also for the step. The aim of our work is to put the responsibility more and more upon the negro race. In order to provide the best service from the negroes for the negroes it is necessary to have a man in charge who is thoroughly equipped for the service. I am contemplating sending a questionnaire to various hospitals to ascertain how much interne work the negro medical student is given in the medical schools. He must have had previous training in clinical lines or a white man must agree to work side by side with him and thus give him the necessary training for clinical work.

In connection with the Atlanta Anti-Tuberculosis Association we have a branch organization for the negroes, of which I am secretary also. As far as possible the negro organizations already in existence are being used for the projection of this work. I have found that there are many such societies and clubs well organized and willing to take on this additional line of work. Among these is " The Neighborhood Union," an organization among the negro women, whose chief function is to investigate the home conditions, with a view to remedying them, to visit the sick with the purpose of preventing the recurrence of preventable sickness, and to

carry on various kinds of neighborly work among the negroes. This organization affords a fine medium for improvement efforts among this race and has met us with hearty support.

The negro organization is made up of representative men and women of the community who are given definite work in regard to their race; there is also an advisory committee composed of white people. The negroes and whites meet in joint session every three months and here discuss questions which are of mutual interest to both committees. Some very fine suggestions have been made in these joint meetings by the negroes and have been accepted and carried out by the whites. One was the employment of a negro nurse.

The responsibility for the work is being more and more thrown upon the negroes; this year we are requiring them to suggest and initiate the lines upon which our activities shall center. Among the things for which they are striving are better public schools, bathing facilities and playgrounds. A committee of the Chamber of Commerce is working at present upon the question of playgrounds and the negroes have been called upon to cooperate in the effort.

The negroes are also assisting in raising money for the support of their work. They assisted in the sale of Red Cross Christmas Seals this year and adopted plans made by themselves. The fund thus raised will be used for their own work. They are giving a musical entertainment in the auditorium of the whites to which whites will be invited, the proceeds from which will be used for open air movies in the negro communities.

Dr. Henry Barton Jacobs, Baltimore: This question of tuberculosis in the negro is a question which those of us who live south of the Mason and Dixon line have very much at heart, because of the fact that our populations have so large a proportion of negroes. Baltimore, with a population of approximately 700,000, has over a hundred thousand negroes, so that one-seventh of the population is black. Our tuberculosis mortality statistics, therefore, are very much influenced by this large negro population, and this is probably why in Baltimore we have never been able to obtain the decided downward curve in the mortality rate which Boston, New York and Philadelphia have been so fortunate as to secure. The death rate from our white population is declining steadily, perhaps in a lesser degree than Boston and New York, whereas the mortality of our negro population is keeping practically on a level and in some years going up a little, so that a general downward tendency of mortality from tuberculosis is interfered with completely. Naturally, therefore, we are trying our utmost to help the negro in his troubles.

Unfortunately, the negro doctors in the South differ in many respects from the negro doctors in the northern cities; they are not so well educated and they are not so enthusiastic in their work. It is very difficult, as I judge the case to be in Atlanta, to get them to take interest in general hygienic questions. It is most discouraging and in our association work, that is, in the tuberculosis association work, we have never succeeded in interesting a large group of negroes in the work for their

own protection and health. We have studied their housing conditions and we have undertaken plans for them to follow out, but they have with the carelessness of the southern negro, let nearly everything drop. The most encouraging feature in reference to the negro in Baltimore is the fact that the negro women have established a negro Civic League, as a branch or as an allied association to the Women's Civic League, the White Women's Civic League of Baltimore.

This League is interested in all good things for the city, cleaning the city, providing backyard gardens, furnishing pure milk, doing away with smoke, bettering the housing conditions, and in general doing all those things which have to do with the better hygiene of the city. As I say, a group of negro women have formed an allied association and they are engaged in really very excellent work, and there seems to be some hope that their efforts may have a very decided influence upon the life of their race.

It will not do then in cities south of Mason and Dixon's line to leave the case wholly in the hands of the negro. The whites must take charge of it, and in Maryland our effort at present is through the Legislature.

We have formulated a bill which failed to pass the recent session of the General Assembly on account of the lack of funds in the State Treasury, a bill calling for a large appropriation, but one of much importance in dealing with tuberculosis among the negroes. The bill provides for local or county tuberculosis hospitals for negroes to be supported by the State, in whole or in part, and to be conducted in conjunction with already existing hospitals; there is also the provision that patients in the dangerous stages of tuberculosis, may if necessary, be forcibly segregated by order of the State Department of Health. On account of the ignorance and carelessness of the negro they become a prolific source of infection, and really a decided menace to the white population. The two races live in more or less intimate relations one with another, as must be the case, when in the population one in seven is negro, and the greater portion of the domestic service of the city is of that race.

In the years to come I sincerely hope better reports may be made of the conditions in Maryland.

Courtenay Dinwiddie, Cincinnati: I want to call attention to the fact that we discovered in Cincinnati recently that our negro tuberculosis death rate was going down faster than our white death rate, which was very surprising to us. We found also that the ratio of negro patients to white in our sanatorium was fully equal to the ratio of negroes to whites in the total population of the city. I am under the impression, although I have not checked up recently, that the ratio of negroes to whites attending the tuberculosis clinic is equal to the ratio of negroes to whites in the total population.

I am not able to offer a full explanation of this. The best guess that I can make is that it is because we have an unusually well organized group of negro physicians, who not only are spreading better knowledge as to clinical methods of treatment among themselves but are taking a

very active part in the educational campaign of lectures, and so on, among the negroes generally.

What I got up to do, chiefly, was to ask Dr. Landis a question, and that is, whether he has been able to show from figures, before and after the employment of negro nurses and physicians, an increased average of attendance at the clinic, on the part of negro patients.

Dr. Landis: I pointed out that only once in two or three weeks did a negro patient visit the dispensary although we were right in the negro belt. The attendance has jumped up from practically nothing to 148 new cases in the past year. Personally, I am pretty well convinced that the interest of the race as a whole will be stimulated in this subject if it is presented to them by one of their own people, either a nurse or a physician. When one of their own race gets up and tells them of the dangers of unsanitary habits which, if persisted in, will almost inevitably get them in trouble, they undoubtedly do pay attention. Only a few weeks ago there was a meeting in which there was an audience of a thousand, many of whom came up afterwards and asked questions. I do not believe, for instance, that you are going to notice or obtain any noticeable decrease either in morbidity or mortality for some years to come, because we know how difficult it has been in the white race. It is only by the most persistent educational measures carried out along this line that improvement will be brought about.

Mr. Dinwiddie: How often do the patients return?

Dr. Landis: We have our ambulant patients return once in two weeks.

Mr. Dinwiddie: What is the average; how many times do they come back?

Dr. Landis: They have been returning quite constantly. I have not been enough in touch with this to tell you specifically how many times each patient did come back, but I know from talking with the physician in charge, that they do. There are a few whom I see in the dispensaries and who I notice have been coming for months. But the thing to aim for is not the results you are getting at the present time, but the fact that more and more you will get them interested and stimulated in this subject.

Dr. Kober has told me repeatedly that the death rate has been materially reduced among the negroes since the Washington Sanitary Housing Co. improved the sanitary conditions. A similar company has been organized in Philadelphia. It was started with the hope that others might see their way clear to build houses of a similar nature and provide better living conditions.

Robert C. Powell, Baltimore: If I may, I would like to add a word or two to what Dr. Jacobs, the president of our Maryland Association, has said about our conditions. I think that Dr. Jacobs mentioned the housing factor. Things are already moving along that line in Baltimore at the present time. The Federated Charities has Mr. Ihlder, formerly the field secretary of the National Housing Association, come to Baltimore regularly, once a week, and several groups have become interested. Cer-

tain properties have been purchased by private capital with a view to demonstrating the type of improvements that should be made; the work is going to be carried on from that point. I think that substantial progress can be reported to-day.

There is a form of organization of the colored people in Maryland, which I believe will produce some good results in the course of time. This organization is only about two years old at the present time. It was about two years ago that the Maryland Colored Health Association was formed under the auspices or the direction of the Medical and Chirurgical Faculty of Maryland. This association has had two very successful conferences, each consisting of three evening sessions. The first one in March, 1915, I remember very distinctly; it was held in a very large colored church in the city and that church was absolutely packed, jammed with colored people. The one night that I was there I think the Commissioner of Health of the city and I were the only two white people in the church. Among the speakers were the late Booker T. Washington, Dr. W. E. B. Duboise of New York and the Commissioner of Health and president of the Board of Supervisors of City Charities of Baltimore. This work is gaining headway and I think will produce certain lines of cooperation in the anti-tuberculosis movement.

There is one question I would like to ask Dr. Landis, if he is still here, and that has relation to the possibility of obtaining colored nurses and the colored physician for tuberculosis work. I have talked over this question with some people with especial reference to the training of colored nurses. The general opinion seems to be rather pessimistic as to the ability to produce a colored nurse with a proper perspective, training and character, the happy combination that can be found in the white nurse in the majority of cases. I would like to know whether Dr. Landis considers that the success of the experiment they have worked out was due to the fact that they have been lucky in getting the proper people for this work, or whether he considers that they have simply acquired normal colored people and that it is possible for the rest of us to obtain people of the same ability and character to carry on this type of work.

Dr. Landis: I can only say this: — I do not know how much luck we have had but I know the first one we got is the equal of any worker I have ever seen. The other two I got through her, and it might be of interest to state the National Red Cross Association wrote to us last fall as to whether we would take graduate colored nurses in our Public Health Course, which we give to nurses, the idea being to put these nurses in the Southern field. We wrote them that we would be only too glad to take them and as I understand, at the present time we have two enrolled. There is a splendid hospital here in Washington.

I think that with the public health courses that are open for rural Red Cross work, more and more you will find colored nurses of the right type going into this work. In this connection I might mention that recently a letter written by the dean of Howard University, took up this very subject making an appeal to young colored men of the better type to

go into medicine with the idea of taking up public health work among their own race.

I got a report from the Board of Health of the city of Jacksonville, Florida, only last week, in which I see that for the past year they have utilized a colored nurse in the public health and tuberculosis work among the colored people. I think you will find that more and more this will be a matter of choice, and, of course, like everything else, you will have to train people along these lines. You have got to remember that when the tuberculosis crusade started the white nurses were not trained women.

Miss Agnes D. Randolph, Richmond, Va.: I should like to say a word with regard to work among the colored people in Virginia. I have no definite figures to give as to the number of nurses employed, but in most instances where a colored nurse has been used she has been successful, and the first nurse has often led to the employment of a second. This was the case in Richmond. Colored nurses are employed in many of the cities.

When, however, we were discussing plans for the organization of the Colored Sanatorium, about to be opened by the State authorities, it was not thought feasible to employ a colored physician. I do not think that the question is quite whether the white physician is willing to employ the colored man, but rather whether the colored man with the equipment and the training in this work can be found to be employed. For the present we have answered this question in the negative in Virginia.

I think it is Dr. Williams' plan to employ colored nurses at the sanatorium and to use the hospital as a sort of clinical school for the colored physician, much as we use Catawba for the white physicians. In Virginia we have an organization, largely composed of the leaders among the race, with which we co-operate; constantly the association acts as a Red Cross Seal agent and during the last year sold $750 worth of seals. This money is used for educational work. We hope to effect some efficient organization in the State through this association.

HEALTH INSURANCE

By John B. Andrews, Ph.D.

New York

About seven years ago we began in America to give serious attention to workmen's compensation for industrial accidents. Investigation indicated that no fewer than 25,000 human lives were sacrificed each year in American industry. The list of serious injuries, incapacitating for a period of at least four weeks, totalled about 700,000 more. Each year of productive endeavor yielded as an incidental product some 45,000 widows and orphans. This truly was a social problem worthy of our best remedial efforts.

The coming of workmen's compensation, which in the short space of five years swept over 34 of our 50 States and territories, was revolutionary in its effects. Accident statistics suddenly became something more than a sorry joke. Information accumulated almost automatically. Millions of dollars, formerly spent in wasteful and contentious methods, were now available to care for the victims of accidents on a systematic, scientific basis. Even those who in the beginning opposed workmen's compensation as a legislative proposal are now loyal adherents of it in practice. Both employees and employers as well as society in general have benefited. And perhaps the chief gain has been the continued economic pressure toward accident prevention. Many employers, in cooperation with their employees and the agents of the State, are now preventing from one-half to two-thirds of their accidents which five years ago they regarded as inevitable. The coming of workmen's compensation gave impetus to the great movement for "Safety First."

As early as 1912 it had become evident to many people that this social insurance method of dealing successfully with industrial accidents would be extended before many years to another and no less serious contingency in the life of the workers. At the annual meeting of the American Association for Labor Legislation, held in Boston that year, a national committee was provided to investigate the subject of workingmen's sickness. The members of that committee include leading authorities of the country on statistics, medicine, nursing, and social insurance.

EXTENT AND COST OF SICKNESS

It has been estimated by the United States Public Health Service that about 3,000,000 persons in the United States are sick at any one time, that each of our 30,000,000 wage-earners loses an average of approximately nine days' work from this cause yearly, that the resultant yearly wage

loss totals $500,000,000, and that medical treatment costs an additional $180,000,000 annually.

Wage studies show that the slender savings of workingmen are inadequate to meet the burden of sickness. A recent investigation of 700 sick wage-earners by the Russell Sage Foundation disclosed that in addition to using up savings the deprivation of income was met (1) by relief societies; (2) by relatives and friends, who were undermining their own health and strength in order to help others; (3) by employers and trade unions; and (4) by borrowing money, taking in lodgers, sending the wife to work, committing children to institutions, and moving to cheaper quarters — all of which tend to reduce the standard of living and to multiply sickness. In 75 per cent. of the families receiving aid from the New York Charity Organization Society, sickness was a very serious disabling condition. About eight-tenths of the relief expenditure of the New York Association for Improving the Condition of the Poor is made necessary by sickness. The economic loss due to the impaired vitality of wage-earners, and to that of ill-nourished and ill-cared-for children when they come to working age, cannot at present be accurately measured, but it must be considerable. Moreover, although much of it is preventable, there are no signs that sickness in America is diminishing. On the contrary, deaths in middle life, due to degenerative diseases, have increased in the United States 40 per cent. during the last twenty-three years. Until some means is found to prevent illness, and to distribute its cost, sickness will continue to produce destitution, dependency, inefficiency, waste, and death.

RESPONSIBILITY FOR SICKNESS

The Committee of the Association for Labor Legislation believes that responsibility for sickness may with justice be divided among three parties — the employer, the workman, and the State.

While not to the same extent as for industrial accidents, the employer is nevertheless largely responsible for the sickness which assails his workmen and interferes with the stability of his working force. Every new man broken in, every man transferred from his regular post to take the place of a worker who is absent, represents a definite financial loss, and much of this loss is but the employer's chickens coming home to roost. Often by conditions common to his trade, such as monotony of work, speeding up, and a work-day of unhygienic length, and also by payment of wages inadequate for proper food, clothing, shelter, and recreation, he undermines the vigor and resisting powers of his workpeople, so that the omnipresent bacteria of disease find the ground well prepared. Not infrequently, also, improper heating, inadequate dust removal, or the presence of any one of more than fifty well-known industrial poisons, lead to illnesses whose occupational origin is even more direct and unmistakable.* The experience of the Leipsic health insurance fund shows a

* The valuable studies of dusty trades by Frederick L. Hoffman are particularly illuminating.

variation of from 20 to 65 per 1000 in the sickness rate for different occupations.

This does not absolve the workman, however, from all complicity in his own ill health, particularly if he nails down the windows in his home on October 1, or in the workroom refuses to use the respirators provided for him. An amusing story is told of some workers in a dusty plant who would not use the shower baths until they were forced to run stripped through a wall of water in order to reach their street clothes. In the selection of food and of living quarters, in personal care and habits, the man who must bear the physical brunt of illness falls in many cases far short of utilizing to the full the facilities for health which are at his hand.

The State also is responsible for much of our sickness. Inadequate supervision of the water or milk supply may mean an epidemic of typhoid.* Failure promptly to discover and isolate foci of contagious disease endangers a whole community. Protection of the people's physique through pure food laws is yet in its infancy. Unregulated housing conditions lead to the insanitary slums of our large cities, and backward methods of garbage and sewage removal spread pestilence in their train. Towards encouraging and elevating standards of industrial hygiene the State has done much, but much more remains to be done.

The need of the hour is for some method of bringing persistently home to each of these three parties — the individual employer, the individual workman, and the State — a due sense of responsibility for the common burden of sickness, and of enlisting the eager services of each in a thoroughgoing campaign of prevention.

INADEQUACY OF EXISTING HEALTH AGENCIES

A careful survey, furthermore, convinced our committee that existing health agencies were wofully inadequate to meet the demands upon them either for cure or for prophylaxis. Fortunately the vast body of medical service is far above the level indicated by a recent advertisement in the Los Angeles *Times* which ran:

> "PERSONAL — ARE YOU SICK? IF SO, BE MADE well by Chiropractic in exchange for ladies' or gentlemen's clothing. All kinds of diseases successfully treated. Phone SOUTH 5532."

Nevertheless it remains regrettably true that the medical profession as a whole is not yet properly organized for the maximum of social service.

The tremendous development of medical science, in bulk, in variety, and in elaborateness of technique, has made possible cures which a generation ago were unthought of. But it has also brought about an era of specialization. It now often takes as many physicians to tend a patient

* According to George A. Johnson, consulting engineer, if the cities of the United States were supplied with filtered water, or water of equal purity, it would mean a reduction of the typhoid toll by 3,000 lives a year, and prevent 45,000 cases of typhoid fever, representing an annual saving of $22,500,000. This, says Mr. Johnson, could be accomplished yearly for about one-half of the present annual cost in vital capital.

as it takes tailors to make a man. One family has been known in the course of a year to engage the services of a laboratory worker, an x-ray man, a general physician, an oculist, a dentist, an orthopedic surgeon, and a throat specialist.

Such specialized service is expensive. It can be secured by the wealthy, to whom strict economy is not an object. It can also be secured, free or at merely nominal cost, by the very poor, in the clinics and dispensaries which, in spite of uncertain financial support, have multiplied seven-fold in the past decade and a half. The great bulk of the people, however, between these two extremes, are in the main cut off from the elaborate resources of modern medicine. Some method is needed of placing these resources upon a sound financial basis and of throwing them open to the masses of the people.

POSSIBILITIES OF HEALTH INSURANCE

Insurance against sickness has been successfully tried out in many older countries. Germany, Great Britain, Austria, Hungary, France, and five other European nations have for years been reaping the advantages of this method of meeting their sickness risk.

Thus, after three years' experience with compulsory health insurance, the British physicians confess that only since the passage of the national insurance act of 1911 have they been able to treat anemia among the working class. In Great Britain, also, the act has stimulated a powerful national crusade against tuberculosis. The first effect has been to increase the availability of hospital beds already in existence but previously inaccessible to workingmen; the second has been to increase the actual accommodations. Within two years after the initiation of the act in England there were 3,000 beds in process of construction, 150 tuberculosis officers had been appointed, 150 new tuberculosis dispensaries had been opened, and nearly 1,000 shelters for out-of-door sleeping had become available. During the initial eighteen months, 19,400 insured tuberculous persons were treated at home, 8,800 through dispensaries, and 19,900 in institutions, making a total of 48,000 insured tuberculous persons who received treatment. Although in time this increased provision will result in improved health and lowered death rate, the act has, of course, been in operation too short a time for any statistical effect to be manifest.

In Germany, however, where similar measures have been in operation twenty-five to thirty years, marked results have been achieved. There the invalidity funds which afford benefit in case of prolonged disability are empowered to prevent the impending invalidity of an insured person by requiring him to undergo treatment. In addition the funds may promote general measures for the prevention of invalidity or for the improvement of the general health conditions of the population subject to insurance. Under the provisions of the law, generous accommodations have been provided, so that, in 1910, 47,000 insured persons were cared for in sanatoria for an average of seventy-three days. In addition to the actual

care of disease undertaken by the funds, they have been active in a campaign of prevention, in part through health lectures and in part through the promotion of improved housing. Because of the causal relation between housing and sickness, the invalidity funds have invested large sums in improved housing schemes, until they have become the most important organization in the German Empire for furnishing cheap capital for better homes for workingmen.

The explanation of this active campaign against tuberculosis is a financial one. According to investigations carried on between 1896 and 1899 tuberculosis holds third place as a primary cause of invalidity among adult German males. In this sense invalidity means a definite reduction in earning capacity. In 1909 the expenditure of the funds upon tuberculosis was 67 per cent. of the total amount spent upon the care and treatment of all diseases. Under such an insurance scheme it is evidently a " paying proposition " to reduce tuberculosis.

The result of these preventive and curative methods has been a marked increase in the number of cures. The tuberculosis death rate has decreased from 34.4 per 10,000 in 1880 to 16.6 per 10,000 in 1909, and to 13.65 per 10,000 in 1913.

The figures are sufficient to show that the campaign has been efficient. In the opinion of leading German authorities this amount of prevention would have been impossible without the industrial insurance laws. Privy Councilor Bielefeldt, Director of the Pension Board for the Hansa Cities, says, " The conviction may be expressed, after the experience of several years, that an effective battle against consumption among the working classes would have been all but impossible without the workmen's insurance of the German Empire. . . . Professor Kayserling and Professor Frankel, who rank among the highest German authorities upon the subject, frankly attribute the progress which has been made in the crusade against tuberculosis *more* to the industrial insurance laws than to any other cause, owing to the fact that these laws have placed within the reach of the working classes resources of healing never dreamt of before."

Moreover, while life has recently lengthened in other European countries at a rate equivalent to five, ten, or even seventeen years a century, in Prussia it has lengthened in twenty-three years at the rate of twenty-five years a century for men and twenty-nine years a century for women. No small proportion of this increase must be attributed to the impulse toward the discovery and application of scientific medicine given by the health insurance law of 1883.

If increased interest in tuberculosis can be aroused by a measure for health insurance, if through this agency the expectation of life can be increased to a degree unparalleled in other lands, is it not time to try what such a measure will do in this country?

HISTORY OF MODEL BILL FOR HEALTH INSURANCE

In June, 1913, the committee's work led to the calling of the first American conference on social insurance in Chicago. Governors of the

main industrial States appointed delegates, and the discussions were participated in by government and labor bureau officials, economists, employers, and commercial insurance men. During the summer of 1914 the committee issued a tentative statement of the essential lines which it purposed to follow in drafting a model health insurance bill.

By November, 1915, the cooperation of a committee of the American Medical Association was offered for perfecting the medical features of the measure. In tentative form 13,000 copies of the bill were distributed throughout the country, and during the months of November, December, and January following, repeated conferences were held for its final shaping before introduction in the State legislatures. Meanwhile words of encouragement came from all parts of the country. Almost simultaneously the measure was introduced in New York, Massachusetts and New Jersey, and legislative hearings early in March in the two former States lifted health insurance from the seclusion of academic discussion into the realm of practical politics.

Principal Provisions of the Model Bill.— The wonderful possibilities which to-day lie latent in our systems of curative and preventive medicine can be made available to the mass of our people only through a comprehensive health insurance system which will put medical service on a sound basis and enable the people to get full benefit of wise medical advice and the right sort of provision in hospitals and sanatoria.

The bill that we have worked out, as Professor Seager has concisely stated, contemplates compulsory health insurance and justifies that proposal on the ground that experience everywhere has shown that voluntary insurance will not reach the classes which need it most. The system must be made obligatory if it is going to render the large social service of which it is capable.

The obligation to insure imposed by the bill is to apply to all manual workers and to all non-manual workers, clerks, foremen, etc., whose earnings are less than $1200 a year. Even home workers are to be included as far as this is administratively possible — the details to be worked out by the commission to be created.

In addition, provision is made with adequate safeguards for the voluntary insurance of persons who desire to gain the benefits of this great cooperative plan and who are not included among those who must insure. The benefits to be provided are medical, surgical, and nursing benefits, medicines and surgical supplies, beginning on the first day of illness and continuing if necessary through the twenty-six weeks in any one year during which benefits are to be paid.

As to cash benefit, the bill proposes that it be two-thirds of wages, and that it begin on the fourth day of illness and continue during the disability but for not more than twenty-six weeks in any one year.

The third type of benefit is hospital or sanatorium care, where this is prescribed, or desired, with the consent of the physician. In that case the cash benefit to the dependent members of the family is to be reduced to one-third of wages.

A fourth benefit is the maternity benefit, which is to consist of medical care for the mother in the case of insured women for not more than eight weeks, on the ground that this is a kind of disability from capacity to earn wages, comparable with illness, and that the need for support during this period for wage-earning women is as great as in the case of ordinary illness — especially great from the point of view of our legal situation, because in some States we prohibit women from gainful employment for a certain period of time immediately before or after child bearing, and therefore deprive them, if they are wage-earners, of their usual source of income.

Finally, there is provision for a funeral benefit of not more than $50.

These benefits are to be paid for out of funds to which it is proposed that employer and employee contribute equally, and to which the State contributes one-fifth of the total; so that the division of the expense will be two-fifths of the sum on the employee, two-fifths on his employer, and one-fifth on the State.

In view of what has been said regarding the occupational factors in illness, it has been thought, Professor Seager points out, that this contribution of two-fifths from the employer is not excessive. Moreover, it is justified by the importance of enlisting his interest in the whole program, and his intelligent cooperation in the administration of the insurance fund. Our experience with workmen's compensation acts shows how much can be accomplished when we make it financially profitable. If we are to start a "Health First!" campaign comparable with the "Safety First!" campaign that is now so well launched, we must make health a paying investment for all in a position to promote it.

It would not, however, be just to require the employer to pay all of the cost of health insurance, as he now rightfully does of accident compensation. The employee's personal habits are responsible for much of his own illness. Through financial interest the workman himself must be aroused to exercise more care for his own health, to discourage malingering, and to cooperate intelligently in the fair and economical administration of the funds. Unless the worker contributes to the fund, it is hard to see also how he could be given voice and vote in its administration, without which the plan would degenerate into mere paternalism.

It is believed also that the State should bear about one-fifth of the financial burden, which is probably not much more than it is already paying in crude and uncoordinated attempts at public health work, in public hospitals and sanatoriums, and in charitable relief to the destitute victims of unprevented disease.

The administration of the plan, as proposed by the bill, is to be vested in local mutual insurance societies, to be supervised by a social insurance commission for the whole State. The local insurance societies are to be governed by representatives elected in equal number by the employers and employees concerned. Employers and employees are to select members of a large committee, the same number from each side; this large committee is to select a smaller board of directors for the insurance society.

As you will observe, this is practically the German plan, and our confidence that it will operate well in this country when established is based upon observation of its success in Germany. We see no reason why in the administration of such a system there should be anything but the most cordial cooperation. The employer would have no motive for hampering the efficiency of the plan. On the contrary, we believe that his advice and assistance will aid it.

This is to be the general type of administrative organization. To supplement it, provision is made for the organization of trade societies in localities where there are enough individual employees in particular trades to make that administrative unit of sufficient size. Then there is provision for voluntary organizations, such as we have at present,— labor unions, establishment funds, and the like — provided that they meet at all points the requirements of the law, comply with regulations of the social insurance commission destined to hold them up to the standards which the law prescribes, and that they are financially sound.

As to the social insurance commission, the central body to have supervision over the whole system, the details are left rather shadowy in the provisional draft bill, because we think this must be adapted to special conditions in the different States that adopt the system. It is proposed that the commission or bureau shall consist of three members; that their position shall be non-political as far as possible, and that their tenure of office shall be long enough to insure continuity of service and the right type of commissioner.

The powers of the commission are made quite broad with a view to enabling it to meet any situation that may develop as the administration of the law proceeds. It is at the same time subject to judicial review in the exercise of its powers, so there is no danger of its becoming unduly autocratic in attitude.*

Objections to Model Bill.— Objections to the model health insurance bill have come in the main from three groups, and probably one of the silliest objections yet raised is that we should not proceed until we have complete sickness statistics. Any informed person must realize that no country in the world ever got sickness statistics worthy of the name until it first got health insurance.

A few employers have objected on the ground that the additional burden would "drive industry out of the State," and that the system is "paternalistic." Careful calculations show, however, that the employer's contribution will equal but little more than 1 per cent. of pay roll, and so slight an expense need not jeopardize any industry. Moreover, this is the same argument which was made a few years ago against workmen's compensation, and we have yet to learn of a single industry which has left any State because of the burden of compensation payments. In fact, under the New York State compensation law, the most liberal in the world,

* The "American Labor Legislation Review," March, 1916, contains the complete statement by Prof. Seager.

it has been found that the total cost to employers is actually less than it was under the old liability system. With reference to the charge of "paternalism," Doctor Royal Meeker, United States Commissioner of Labor Statistics, has said:

"Many earnest people are afraid that social insurance will take away from the working man his independence, initiative, and self-reliance, which are so celebrated in song and story, and transform him into a mere spoon-fed mollycoddle. This would be a cruel calamity. But if the worst comes to the worst, I, for my part, would rather see a race of sturdy, contented, healthful mollycoddles, carefully fed, medically examined, physically fit, nursed in illness and cared for in old age and at death as a matter of course in recognition of services rendered or for injuries suffered in the performance of labor, than to see the most ferociously independent and self-reliant super-race of tubercular, rheumatic and malarial cripples, tottering unsocialistically along the socialized highways, reclining self-reliantly upon the communal benches of the public parks and staring belligerently at the communal trees, flowers and shrubbery, enjoying defiantly the social light of the great unsocialized sun, drinking individualistically the socialized water bubbling from the public fountain, in adversity even eating privately the communistic bread provided in the community almshouses, and, at last going expensively to rest, independently and self-reliantly, in a socialized or mutualized graveyard full of little individualistic slabs erected to the memory of the independent and self-reliant dead."

Certain representatives of trade unions have entered protest, usually not against the purposes or principle of the measure, but against the provision that the workers contribute to the insurance funds. In other words, they are willing to receive the benefits, but are unwilling to bear their share of the expense. However, such far-seeing representatives of labor as James Duncan and John Mitchell recognize the need of legislation to create a system of health insurance, and needless to say, a system supported solely by the State and by the employers cannot be as liberal or as efficient as one in which the insured persons themselves meet a just portion of the expense and participate in the management.

From a certain element of physicians, also, dissent has been heard. These practitioners, largely "lodge doctors," agree with the principle of universal health insurance and, in common with the leaders of the profession, recognize it as inevitable within the next few years. Their opposition is directed at minor administrative details in which they fear that their interests may not have been sufficiently safeguarded. As the movement for health insurance develops they will be given full opportunity to present their concrete suggestions, and there is no doubt that as is now the case in Germany and in England the medical men of the country will soon stand as a unit in support of this twentieth century device for cooperation within the profession. Already the American Medical Association has appointed a committee to assist in perfecting the medical

details, and Dr. Rupert Blue, surgeon-general of the United States Public Health Service and president of the association, has declared that "Health insurance is the next great step in social legislation."

CONCLUSION

This, then, is the situation: For our present waste and suffering through unchecked disease there is a three-fold responsibility, shared by employer, employee, and the State. Each of these three has a compelling interest, perhaps only dimly glimpsed as yet, in the prevention of preventable disease and in the prompt succor and relief of that which cannot yet be prevented. For the attainment of these purposes the three interested parties must be welded together in a progressive, educational, health movement, and such a movement can be called into being through a comprehensive plan of health insurance with its burdens equitably distributed. To this end the American Association for Labor Legislation earnestly and hopefully invites your cooperation.*

DISCUSSION ON PAPER BY DR. ANDREWS

James Jenkins, Jr., Brooklyn: I want to go on with one of the arguments that Dr. Andrews has just made. He spoke of the cost of insurance and talked about the cost to the State and the cost to the employer, but he did not mention the cost to the employee. This has been brought up as an objection by a good many people, who say that the poor workingman would have to spend more money for this form of insurance than he now spends for industrial insurance in other forms. As a matter of fact, the bill which has been introduced in three States provides cheaper insurance than any of the forms of insurance now carried by the workingman. By it he would pay less and get more for his money.

The special knowledge that the tuberculosis committees have ought to make us of the greatest help in this movement for health insurance. We doubtless know the number of cases in our community; we know that poverty is caused by sickness; we know the pride of the workingman and woman, who will not give up their work and who indeed cannot give up their work; we know their lack of faith in private charities; we know the breakdown of private charities; we know the need for early care and diagnosis.

These facts should make us go out as pioneers and help such associations as the Labor Legislation Association to push the question of health insurance, and thus another step towards social justice.

In the winter of 1914–1915, the Brooklyn Bureau of Charities made a small study of the causes that had brought 287 active cases being helped by the Brooklyn Bureau of Charities to poverty. This was the winter of great unemployment caused by the beginning of the war. Of the 287 cases studied, it was shown that there were more charity cases caused by

* Copy of the model health insurance bill, with additional information, may be had by addressing the Association at 131 E. 23d St., New York City.

illness, and illness and unemployment together, than were caused by unemployment alone. This fact ought to make every charity organization society recognize the need of health insurance.

One of the greatest arguments for health insurance that Dr. Andrews has brought out is that it is the means of prevention. I believe that having the community pay the cost of sickness would greatly encourage the preventive means that have been started by employers, the State and the employees. Up to the present time in the United States, we have considered sickness to be a private problem. Each family is expected to take care of itself. Most European countries, however, consider the care of the sick to be a public function and have passed in some of the countries sickness insurance before accident insurance. A good many of us believe in social insurance along a number of lines, but I think perhaps the greatest appeal could be made to the public for sickness insurance. Certainly it seems to many of us that health insurance ought to come before insurance for unemployment.

I agree with the Association for Labor Legislation, that the German plan in general is the plan that we ought to adopt, possibly with some modifications. There are several questions that should be decided about sickness insurance and they group themselves in my mind in this way: Should it be compulsory or voluntary? We all agree for various reasons, that it should be compulsory. Competitive or non-competitive? No doubt we all agree that it should be non-competitive. What should be the control? State, local or private? I think that the control should be State and private combined. Should the collection be by employer or at home or office? The employer seems to be the best channel for collection. Should the fund be State, local, or private? I agree with Dr. Andrews and his association, that it should be along the lines of the German system, which is a combination of State and private.

Health insurance might utilize private organizations, such as benefit societies, labor unions and labor union benefits. It has been suggested, although I cannot be sure I agree with it, that the great mutual life insurance companies, carrying millions of policies, might in some way be worked into this scheme.

One of the reasons that I have been asked to speak on health insurance is because part of my job is to run a sanatorium, which is largely managed by the labor unions, and we have the experience week in and week out of having cases brought to us for admission of workingmen, who are in the most advanced stage of tuberculosis. We urge the unions not to bring us these cases as we are not in a position to accept them and their answer is always the same: "The workingman will not give up his job until he is ready to die; he will not accept private charity and so he stays on the job." I think Dr. Andrews has brought out quite clearly that the passing of the health insurance laws would make it possible for these men to be taken care of out of the insurance funds that they have and which they know are partially theirs.

Labor unions do give benefits but very few of them give adequate

amounts and although labor unions are interested in health, they are not so interested now as they would be if every one of their men were paying towards a general sickness fund.

The talk of preparedness is heard on every side but large armies and large navies are ineffective unless backed by efficient industrial organizations. We are trying, in the United States, to make democracy efficient. Any program for preparedness that leaves out of account such tremendous waste as that caused by preventive sickness, is certainly futile. Health insurance would be an important move toward proper preparedness.

Dr. Hoyt E. Dearholt, Milwaukee: Personally I believe that the optimism of Dr. Andrews concerning the nearness of the time when we are to have some form of health insurance is amply justified. I do not know what form it will take, but I know that we are going to have something of the sort, first of all because it is one of those desirable things that it seems to be almost impossible to find any good argument against; and second, because I believe that, as Dr. Andrews has suggested, it is going to be found to be just as good business for employers to have health insurance as it has been to engage in the Safety First movement.

In this connection I was interested in the instance of one firm in Milwaukee which made an expenditure of $50,000 in one year for safety appliances in their plant and found at the end of that year, very unexpectedly, that this amount had been returned to them in financial savings by reducing the number and costs of accidents.

The representative of the Wisconsin Industrial Commission, who has charge of the safety work, informs me that their greatest labor to-day is in keeping firms from going too far. They have to put on the brakes to keep employers from spending too much and thus bring about a dangerous reaction.

Dr. Andrews referred to the medical profession in a way that excites a little resentment on my part. However, the attitude of the medical profession is one of the important factors in this whole proposition. It is true that there will be a considerable amount of opposition on the part of physicians to the inauguration of health insurance, this notwithstanding the fact that practically all physicians of the better sort, who have had experience in social medicine, have felt for a long while the need of some organization method which will permit physicians to be active in a community rather than passive.

I mean by that that as we are called upon to practice medicine to-day, we must sit back and wait for the patient to take the initiative in coming to us for treatment and for advice. This, of course, is all wrong. The years in which the young medical men have the greatest possibilities for good and enthusiastic, hard and energetic work are those in which they spend almost all of their time sitting in the office entertaining book agents and detail men from the drug firms.

This is all wrong. So, I think that the best men in the medical profession are going to welcome whatever it may be that will give the mass of

physicians the opportunity to apply their learning and their ability in a time and place where it is needed.

Nobody realizes more than a member of the medical profession, many of its shortcomings. But I want to say this, however, that practically every effort that has ever been made in State legislatures, or elsewhere, to raise the tone and the quality of the medical profession has been introduced by that profession, and such measures have almost never been supported by anybody but physicians, with the result that the profession is charged, whenever it attempts to raise its standard, with an attempt to create a medical trust. This charge is made when it is acting against its own immediate, personal advantage. It seems to me that we are going to have opposition, as I said, to this measure, from a certain element of the medical profession, and it will not be the best element. This health insurance enterprise is not going to come into being in a day or a week, and there seems to me to be an opportunity for the people in social work who appreciate the need of high-class physicians, to go out and do something in the effort to get a better class of physicians.

I have studied over the booklet of Dr. Andrews' organization, and listened to him carefully to-day to see if this proposed plan is to be as general in application as I feel it needs to be. While I live in a good-sized, industrial city, I like best to be considered a rural, public health man, coming from a State which is more than one-half rural, because I believe that States that are largely rural are more typical of America — I mean America in the broad sense of the country — than the industrial cities are.

I noticed an interchangeability of terms and changing of the terms — "industrial insurance" and "health insurance." Now, I personally believe that if we do not look out we are going to have some scheme that will be altogether too much industrial and not general and not to apply to our needs. I think it is most important, too, as a citizen of a State whose legislature is controlled largely by farmers, to have something that is going to interest the farmer and be of benefit to him. The more one studies the health problem, the more he finds that the conditions that we find so commonly and so easily to be bad in the large cities, are almost equally as bad in the country if we take the greater trouble of finding them.

As I said in opening, I am optimistic that something in the way of health insurance is coming. Just what I do not know. I do not think there is anybody who knows just what form it will ultimately take. I do feel, however, that we need in America a system that is a little different from the German especially, as I understand that industrial insurance has not been taken up well in the large rural agricultural districts of Germany. I think we must remember that America is largely an agricultural nation and that farmers need to be provided for. Finally an ideal system will require a great deal of hard work and considerable patience, —but not too much patience.

Dr. Edgar Sydenstricker, Washington: The vital relation of health insurance to the tuberculosis problem among wage-earners and their

families lies in the fact that a governmental system of health insurance can be made a *powerful preventive* agency. Speaking of the preventive results of the German social insurance systems, Ministerialrat Frederick Zahn has said that there has followed "a systematic campaign against tuberculosis, drunkenness, venereal diseases, the lack of workingmen's dwellings, . . . for the schooling of the workingmen and their families in social hygiene, enlightenment of the insured by regular lectures, etc. This campaign is being carried on in part by workingmen's insurance alone, in part in conjunction with organs of public welfare." The preventive result in Germany has only begun to be seen, however, although Germany has had governmental health insurance for 30 years, because only in recent years did the preventive possibilities become clearly realized. In this stage of formulating governmental health insurance measures in the United States, there is an unusual opportunity to benefit by the experience of other countries and to accomplish quickly what other countries have long been endeavoring to accomplish. It now seems hardly necessary to say that the greatest advance that experience points out to be possible is in the direction of making health insurance a directly effective method of disease prevention. As long as health insurance is *merely* a method of relieving the sick, even though it be made compulsory for all wage-earners and be administered as a public measure, it cannot be considered as an essentially preventive method. Preventive action, it is true, may be incidentally stimulated by such means, just as fire insurance has helped to lessen fire hazards, or as death insurance, pleasantly spoken of as "life" insurance, has aided in decreasing mortality by reason of a farsighted policy on the part of certain insurance companies. *But unless health insurance* is *definitely linked up* with forces for the promotion of health, its preventive value will continue to be incidental rather than fundamental.

The right kind of health insurance administration is thus peculiarly a thing in which those who are especially interested in eliminating tuberculosis may take a deep interest. As a relief measure health insurance will result in increasing the physical resistance of the individual by bringing the service of the medical profession within reach of the low-paid worker and thus providing for prompt medical attention to those who are now either without proper attention or who receive attention too long delayed. But with proper provisions in the law for stimulating and coordinating the work of public health agencies, employers, and employees for the improvement of working and living conditions, health insurance should be distinctly an anti-tuberculosis measure.

A review of the experience in European countries and of the situation in the United States would appear to indicate that this can be accomplished along three definite lines: (1) By providing an efficient staff of medical officers detailed from the Federal or State health departments, to enforce the regulations issued by the health insurance administrative body; (2) by providing a fair and sufficient basis for the active cooperation of the medical profession; and (3) by providing for a close coopera-

tion of the health-insurance system with State, municipal, and rural health departments and boards.

A staff of especially trained medical officers to sign disability certificates would be a connecting link between the medical profession and the health promoting agencies and the health insurance administration. They would not only aid in preventing *malingering* and relieve the family physician of the responsibility for disability certificates which is distasteful to him, as well as unfair to him, to his patient and to the fund, but they would be an active force in turning the efforts of local health departments and of employers into the most effective directions.

Free choice of physician by insured persons is necessary, but free choice of physician without safeguards for the physician and for the fund, in Great Britain has proven to be as *unsatisfactory* as *restricted* choice of physician in Germany. The experience under the British National Insurance Act is illuminative. The British Act to meet the demands of free choice of physicians provided that the local government insurance committees should administer the medical benefits in such a way as to allow the individual insured person to select any physician on the "panel" or registered list. After considerable disagreement as to fees and other details, a compromise was effected which resulted in the registration on the "panels" of nearly all the physicians in each locality, and every insured person could thus have his family doctor attend him and pass on his rights to receive benefits from the health insurance fund. This situation, while satisfactory to physician and insured person, caused a serious and improper drain upon the fund by greatly increasing the number of malingerers, since the family physician was entirely too complaisant in signing disability certificates entitling his patients to benefits. To meet this defect medical referees have been appointed in some localities to investigate and sign all certificates of doubtful character. This plan of medical referees seems to have proven successful wherever tried. If, as suggested above, a staff of medical officers is provided, one of their first duties should be to act as medical referees and provisions should be made that no benefit be paid except on certificate signed by them. It is not necessary to point out the possibilities of disease prevention which may be expected by the visits into the home of every sick beneficiary of a skilled sanitarian in addition to the attention of the family physician.

The control and administration of the health insurance system should also be closely correlated with local health departments. The problem of the health of the wage earner and his family is so intimately bound up with the general problems of public health that the mistake of permitting local health departments and boards and the health insurance system to operate independently of each other is a vital one in hindering the success of disease prevention. This mistake was amply evidenced in the failure of the British health insurance system to utilize the existing public health agencies to a greater degree. With a staff of medical officers detailed from the national or State health departments, as suggested above, cooperation with local health authorities will be a natural result. In

many localities it might even prove practicable for the officer of the medical staff to serve as the local health officer. Certainly the best results can be obtained only when these two forces are coordinated.

Such methods as these, it is believed, will serve to utilize the full force of the powerful financial incentive for lessening ill-health that a health insurance fund, jointly supported and controlled by employers, employees, and the public will generate. For, aside from the value of bringing employer and employee together for a common purpose, there is a specific advantage in the incentive afforded by financial participation and joint control. The rate of payment of contributions or premiums in any trade, industry, or locality should be determined by the amount of sickness in that trade, industry, or locality. The lower the sick and death rates, the less may be the premium necessary to provide for sick and other benefits. It is reasonable to expect that when an establishment or trade finds that its premium is much greater than in other establishments or trades an effort will be made to find and remove the unhealthful conditions that cause the excessive rates. It must be apparent, therefore, that there would be thus afforded a strong incentive, that of self-interest expressed in terms of money, for the employment of measures to reduce the hazard of disease and thereby lessen the cost of insurance. The employee will have in mind the saving made possible by reducing the hazards of sickness so far as they are under his control, and he will be stimulated to report cases of malingering or of insanitary conditions. The rate of contribution paid by employers has been made large enough in the most successful European systems to afford the employer the same sort of an incentive to provide for sanitary conditions of work and to cooperate with other agencies in removing the causes of disease among his employees. Since contributions to health-insurance funds by national or local government are in the nature of a tax upon the public, there is afforded an additional stimulus to public measures that reduce the cost of sickness. When a community suffers from an excessive sick rate and taxes are increased in order to meet the public's share in local insurance funds, the health of the wage earner will become a local issue of much greater interest than it is at present.

It is reasonable to expect that such an incentive will be called into existence. It is more than probable that employers and employees will have, in jointly supported and controlled sick funds, a common ground for cooperation as well as an incentive to cooperate. The chance to grasp such an opportunity for preventing disease, particularly a disease such as tuberculosis which bears so close a relation to working, home and community conditions, should not be neglected. A greater emphasis should be given to the methods by which health insurance can be made not only a much needed relief measure but an effective health promoting machine. We need, not new agencies for the prevention of disease, but an effective coordination and strengthening of existing agencies. A governmental health insurance system presents an opportunity for at least one method of coordination which appears to be practicable.

Dr. Thompson Frazer, Asheville, N. C.: I have been especially interested in this matter since reading the paper by Dr. Warren referred to and have enjoyed listening to Dr. Andrews' able presentation of the subject. To me there seems no question as to the desirability of health insurance; under present conditions the workingman receiving approximately one hundred dollars a month is hard put to it to meet the extra demands when taken sick; moreover, as has been pointed out, he does not stop work when first taken sick because his income stops too, and for this reason he loses several days of proper treatment, and we know how valuable the proper treatment is at the onset of a disease. These disadvantages are overcome to a great extent by the proposed measure which distributes the responsibility, fixing it where it belongs, on the individual, the employer and the State.

I do not think that the compulsory feature is an objection to the plan; if the plan is to work it must be compulsory for in no other way can the per capita charge be made low enough to be borne by the man getting between $800 and $1,200 a year.

Nor do I feel that although the medical services rendered by the physician would be in the nature of contract practice this constitutes a valid objection to the plan; we have at present many forms of contract work that are recognized as legitimate. And it must be admitted that what Dr. Andrews says of the medical profession is true — the very poor do not always get proper medical attention.

It has been objected that the cost to the workingman would be prohibitive. According to the figures in Dr. Warren's pamphlet this is not the case. He suggests that the workman, being the one most benefited, should pay fifty per cent. of the total cost, this being $26 per year; while the employer should pay 40 per cent. and the community the other ten per cent. Surely, thirteen dollars is not much to pay for a year's medical attention; indeed it is less than the workman now pays, for the average loss is nine or ten days a year with doctors' bills, medicines, etc., which amounts to considerably more than thirteen dollars.

Dr. Philip King Brown, San Francisco: May I ask Dr. Andrews, in closing this discussion, if he would express his views on the question of how we may avoid, in this country, the conflict which is carried on between the profession and the law in England, to the end that we may better help what it is our duty to help, the putting into active operation, to the best advantage of the workingman, of that bill. I asked the question because I come from that part of the country that has carried out most extensively the private health insurance plan; that is, in the railroad companies and the German and French General Benevolent Societies that have existed in San Francisco for more than fifty years. They have paid salaries to the medical men connected with such institutions and the great advantage is that instead of the doctor being paid by the visit he is paid a salary for what he does and accordingly his interest and the patient's interest and the employer's interest become immediately the

same. The sick man or injured man should be restored as nearly as possible to full earning capacity in the shortest possible time.

Opposed to the idea of salary is the medical profession at large, who want to stick to their colors and feel that through more perfect organization they may constantly boost the price per visit that they are going to get. That is a disastrous thing at best and I know that this conflict is going to come. We have a State Commission appointed to study the question and we want to put out a bill that will cause the least opposition from the medical profession and at the same time give the sick person the very best possible medical care.

Dr. William A. Sawyer, Sacramento: I believe that health insurance is coming and is coming soon. I differ with Dr. Sydenstricker in one point. He advocates that there should be a free choice of physicians, and places emphasis on that. That system has most decided disadvantages. The representatives of those who pay for the insurance should have the power of selecting the panel of physicians on the basis of efficiency. I believe that the system should be centered about the institution. We should, so far as possible, provide for bringing the sick to a central institution, where they should be assigned to the expert who can do the most for them. I believe that if we do not solve it in this way we shall not have the highest grade of efficiency and specialization in medical care.

Then there is one other point. In the meeting of the California Conference of Social Agencies held last week in Los Angeles I had the privilege of hearing a member of the Social Insurance Commission in California speak, and she advocated that special provision be made for tuberculous persons. The limit placed on the length of time that a person will be cared for under health insurance should not apply to tuberculosis. This conclusion was reached through investigations which showed that tuberculosis was one of the greatest single risks of the workingman.

Therefore, I wish to advocate here that the limit placed on the length of time a patient can receive benefit under health insurance be not applied to tuberculosis.

Dr. Andrews: Dr. Brown has raised one of the most difficult questions that will have to be faced in working out a plan for the administration of health insurance. In the first two tentative drafts of the bill the Committee purposely refrained from attempting to work that out in detail and instead invited the cooperation of the medical men themselves. Physicians have come forward with suggestions during the past two or three months and as a result of a number of conferences with them there has been worked out a plan which is in a way a sort of compromise between the plan urged by Dr. Sydenstricker and the system to which Dr. Brown has alluded.

There are difficulties, of course, with the capitation system. If you permit a physician to start out to practise at so much per head there is a temptation for him to get too many patients, to be careless in his work, and to have more work to do than he can do well. That may be guarded against by limiting a physician's practice to 500 families or 1,000

insured people. Of course, the physician could have some additional practice if he found it possible to handle it. Then there is the visitation system, which perhaps appeals more to the average physician, but there again is the danger that some physicians may visit patients too many times and thus have a serious effect on the funds.

Between these two contrasting systems there is a compromise possible, whereby a sum collected on a per capita basis is divided among physicians in accordance with the services rendered by each. That will give many of the advantages of the capitation system and would permit the visitation system also under proper safeguards. That is a part of the plan which is being put out tentatively by the Committee in the third edition of its bill, a pamphlet of which I have here in proof form. We will send copies to all who ask for it.

In conclusion I want to say to my friend Dr. Dearholt, of my own native State, Wisconsin, I intended to say something good about the physicians too, but my time was short and the Chairman cut me off.

TUBERCULOSIS RELIEF ASSOCIATIONS

By Charles J. Hatfield, M.D.

New York

This paper is based upon an investigation conducted over a period of a year or more by various agents of The National Association for the Study and Prevention of Tuberculosis. The results of the investigation have just been published in pamphlet form and are ready for distribution. The speaker conceives his function to be the introduction to the audience of this pamphlet, with some brief comment upon it.

Limitation of the field of discussion is desirable at the outset. It should be understood that work in the relief of tuberculosis as conducted by various labor unions in the establishment of great sanatoria at climatic resorts is fully recognized and endorsed. Our subject to-day, however, deals with the local or community relief, where the working men have tried in various ways to muster the available resources of their respective localities in order to take care of their own tuberculous. Moreover, in our discussion we should bear in mind that we are talking of plans that may be adapted with modifications to any community.

When the investigation of tuberculosis relief associations established under working men was undertaken, it was found that there are comparatively few places in which such relief has been systematically attempted. In New England, in various towns in Connecticut and Massachusetts, there have been a series of valuable experiments in this line; certain phases of the work have been tried in Albany and Buffalo in New York State, and in Newark, N. J. At the time of the investigation, the places named covered the entire field that seemed to provide material.

It is not necessary to emphasize the fact that tuberculosis is a problem of great importance to working men. It is often spoken of as an occupational disease and sometimes, doubtless, with truth; but it is not an occupational disease in the sense that poisoning by lead and phosphorus is so named. When we consider tuberculosis in connection with occupation, we have great difficulty in fixing upon a definite relation. For instance, cigar makers and stone cutters have a high mortality rate from tuberculosis. Has it been thoroughly established that this high rate is due to the trade or occupation? Must we not take into consideration the conditions of working and living as well as the kind of occupation? This point has been demonstrated in the investigation of the garment workers' trade carried on by Doctor Landis and Miss Reed of the Henry Phipps Institute. In a study of a number of shops, it was found necessary to consider not only the working conditions but also the home and living conditions, such as hygiene, finance, food supply, and the way the hours of leisure

were spent. Before classing any occupation as predisposing to tuberculosis, all of these factors must be taken into consideration.

It should be noticed that there is an interesting similarity between certain of the methods of relief developed by working men's associations and the points emphasized in health insurance, concerning which there has been recently a lot of discussion. The point made by certain of the associations that the expense in caring for the victim of tuberculosis shall be shared between the individual, the employer and the State is of course one of the fundamental points in our modern thought concerning health insurance.

Four types of relief associations among working men have been studied. The first is the Working Men's Free Bed Fund which has been developed to a considerable degree in Hartford, New Haven and other Connecticut towns. In the plan of this form of association the employer, the individual and the State are included. A second type of organization is shown by the Employés' Relief Association. In this class of organization the employer is in a more or less paternal relation; corporations have been induced to pay for the care of their employés at convenient sanatoria. A third form may be classed as a Sanatorium Association, where local groups of working men, usually in labor unions, organize and support a sanatorium for their members, largely through their own resources, sometimes with public subscriptions and help from city or county. The fourth form of organization starts with educational work and leads to care of patients either at home or in sanatoria. In the last type of organization the prevention of tuberculosis is more distinctly emphasized.

When we attempt to decide as to which of these four types may be the ideal plan for a given locality, we have a difficult problem. Each community presents aspects peculiar to itself. We may start, however, with the conception that wherever possible a division of the burden between the individual, the employer and the State should be provided. If an efficient system of health insurance is developed in this country a great advance in our peculiar problem will be made. We cannot wait, however, for general legislation. We must plan at least to start the work and do what we can for each individual locality in the hope that legislation may later relieve us of a part of the burden.

Two points as to the form of organization seem to be suggested by a study of the relief associations at present in existence. First, some place for the participation of the employer should be found. The corporation is interested in an entirely impersonal way in the health of its employés. No one will deny that health makes for efficiency and economy. Secondly, the actual control of the organization should be retained largely in the hands of the working men. It is psychologically important that the responsibility for the conduct of the organization be laid upon the greatest number of individuals interested, if we wish to promote efficiency not only in finance but in education and prevention. The average man will cooperate heartily where he feels that he has a definite part in management. Where there is responsibility, there is active thought for

finance. Where there is active cooperation the fundamental purposes of education and the prevention of the disease are accomplished.

The methods of raising funds for the conduct of such an organization should be carefully considered. In our investigation money has been collected by assessment of members of the group; by voluntary contributions within or without the group; by participation of the employers either through an arrangement by which they duplicate the amount gathered by the members or make a certain fixed subscription; in addition also special financial campaigns of various kinds have been managed.

A very important consideration when laying plans for the ideal tuberculosis relief association is that there must be machinery for the discovery of early stages of tuberculosis. In the groups covered by the Association's study, this machinery has not been sufficiently developed. In certain groups it is left to the patient himself to complain when he feels ill and to apply for treatment; as the victim usually works as long as he can before applying, the majority of cases have reached an advanced stage. It is highly desirable that we provide means for early discovery so that incipient cases may be discovered at a stage when they may be restored to working condition. At present this machinery is probably best provided by a system of periodic examinations. You are all familiar with the attitude taken by the National Association in recommending periodical medical examinations for all individuals, the healthy as well as for those that are complaining.

In our plans for the local tuberculosis relief association the relief feature should be given a prominent place,— in order that the association may make a popular appeal to the working men, as well as because relief is the most obvious necessity. Where relief is given it should usually be indoor rather than outdoor relief. It must be under complete control and careful supervision. It must not be given in a way that will interfere with the independence or the morale of the family. In certain of the associations studied, relief has included not only the patient but also the family during the time the patient is incapacitated.

Provision for a campaign of education as to the wider aspects of tuberculosis in the community should be incorporated in every plan. No popular movement for public health can be successful unless the public is informed as to the facts and necessities of the cause. The working men's tuberculosis relief association can perform a great and important duty to its community and its trade by carrying on this campaign of education whether it be in the way of printed matter, lectures or exhibits, motion pictures or any other of the forms so readily secured. In order to inform a community a careful study of the situation must be made. For that reason the association must carefully record the facts as shown in the public health and other available records, and as demonstrated in each individual case handled by the association. In this way the working men's tuberculosis relief associations may do a tremendously important work in building up a mass of carefully taken statistics that may supply

information as to the incidence of tuberculosis under various conditions of work and living.

Finally a tuberculosis relief association should keep in touch with the legislative measures that are enacted. It should work for the enforcement of existing legislation and should plan for the development of additional laws that may be needed.

In conclusion it is unnecessary to urge upon every representative of a general anti-tuberculosis association in this audience that he consider very carefully the possibility of enlisting in his own community this great army of efficient workers. They are vitally interested; so far they have not had a chance to cooperate. Through careful planning and an adaptation of the facts as well as through the study of successful experiments in other localities, they can be helped to help themselves in reducing their morbidity and mortality from tuberculosis.

DISCUSSION ON PAPER BY DR. HATFIELD

Dr. David R. Lyman, Wallingford, Conn.: I shall confine my remarks to a discussion of the Employees' Relief Associations of Connecticut and will try to show you in just what ways they have proved so valuable in our campaign in that State. I think all tuberculosis workers will agree that the greatest obstacles which we have to overcome in the handling of patients of the wage-earners group are:

1st. Lack of funds to provide for adequate treatment.

2nd. The difficulty of finding the cases, both early and advanced.

3rd. The difficulty of persuading early cases to go to a sanatorium, or to remain there long enough to secure a permanent result.

4th. The refusal of many cases to take any treatment at all if it involves their accepting charitable aid.

5th. The lack of funds to provide for the treatment of children.

The Employees' Relief Associations of Connecticut provide these five needs for us in far greater measure than any other agency, and my close association with their work has convinced me that an extension of these or similar organizations throughout our industrial centers would constitute a tremendous advance in our campaign.

Their organization is comparatively simple and entails practically no expense. It is necessary first to secure the cooperation of a few of the leading firms of your city, and then the interest and aid of a few of the leading employees of these firms. The success of the plan depends absolutely on the choice of these latter. They are the ones who must undertake the work of bringing the association and its aims to the attention of the employees in the different establishments, and must be men whom the employees know have their interests at heart, and can be absolutely relied upon to make good on any proposal they may put forward.

Wherever these associations have started, whether limited to an association of industrial plants and their employees, or on the broader and

better basis of a cooperation of these with the general public through the local tuberculosis organization, their work has proved an unqualified success. Their scope is practically that of a cooperative health insurance company covering treatment of tuberculosis only. It has this distinguishing feature, however: In the factories and stores which form its cooperating units the association undertakes to provide treatment not only for all subscribers to its funds but for any employee and any dependent of any employee in its units whether he or she subscribed to the funds of the association or not. Working on this basis the New Haven Association now stands responsible for furnishing institutional care for all cases of tuberculosis occurring in about thirty thousand of the working men and women of New Haven and their children. You are all familiar with the old problem of having to tell some wage-earner that he has tuberculosis, and trying to put heart in him and convince him he can be cured, only to come up against the often insurmountable lack of funds. In New Haven, Meriden, Wallingford and other towns where these associations exist this problem has been greatly diminished. If the patient be connected with any of the firms where these associations are established you can at once assure him that his treatment is provided for, and that, not for any limited time, as in the sick benefit association, but indefinitely. This applies to early and advanced cases alike. They will pay for the early cases until the physicians declare them able to return to work. They will pay for the advanced cases until the end, if needed; and that not only solves the problem of the danger of infection in their homes but leaves the other members of the family free to work instead of requiring their time to be given to nursing the patient. The great value of these associations lies in the fact that their aid does not come in the form of a charity. The worker can and does look upon it as an insurance for which he has paid and accepts its aid gladly as being justly due him. This is responsible for our getting many cases to take treatment early in the disease. Formerly when early tuberculosis was diagnosed many would prefer, purely for economic considerations, to try to take treatment at home, and in this way failed to receive training in the care of their cases at the time when it would have been most valuable to them. Now, however, they reason that if they must stop work there is no advantage in providing their own food and medicine at home when this insurance fund has already been paid for and will assume this expense for them. The funds of these associations not being a charity make all the difference in the world and enable them to reach the many cases who would otherwise refuse aid and treatment. We have found them, as I said before, of great benefit in leading to the discovery not only of early cases but of cases of all types. In our town of Wallingford with about twelve thousand inhabitants we have usually had three or four cases in our sanatoria. Eight months ago we organized one of these Relief Associations there. To-day our association is paying the bills for twelve patients in the sanatoria of the State. The doctors, the ministers, and

the charitable organizations in general have found no difficulty in providing us with cases to care for, once we found a means to furnish relief without making the patient an object of charity. The Employees' Relief Associations are of value in providing for the children. The adequate care of these has always been a hard problem. Not being wage-earners they have nothing put by and their families cannot afford the economic sacrifices that they would feel justified in making for a limited time in order to save the services of a wage-earner. More than this the treatment of tuberculosis in children, to be adequate, must be continued for a far longer time than in the case of adults. Unlike the adult the child cannot be called upon to assume the responsibility of its after care. Training will not suffice and treatment cannot be carried on indefinitely to an apparent cure, and the relief associations provide for this.

One important feature of this movement should not be overlooked. It leads inevitably to the knowledge by the working man that tuberculosis is not merely a great general problem but is the greatest problem of his own people. The men are contributing their funds; they are watching how these funds are spent; the problems of the patient among their fellow workers and the progress of the individual cases are constantly kept before them, and are keeping their interest stimulated. They are watching how their sanatoria are conducted. They are coming to study very closely the legislation which is proposed toward the control of this disease and they are studying how best to utilize their organization to aid in the fight. The New Haven association, for example, already employs a field secretary and is now preparing to make a careful study of the economic and industrial relationships of all cases coming under their control. We in Connecticut feel that these associations, whose work is that of a partial health insurance affecting tuberculosis only, have demonstrated the great value of a general health insurance in that they have proved that such insurance leads inevitably to the discovery of unsuspected cases, the segregation of advanced cases, and the provision of adequate terms of treatment for all cases.

The extension of the Employees' Relief Associations throughout our other States would not only give a great impetus to the tuberculosis campaigns in those States but would, I feel certain, be of the greatest possible aid in convincing all who have the opportunity to watch and study their work that a general scheme of compulsory health insurance is the greatest essential to the complete development of our public health work.

James Minnick, Chicago: Mr. Lawrence Veiller in beginning his discourse on Housing at last night's meeting referred to the fact that the tuberculosis movement took up the study of factory conditions and presented that subject for discussion by the Advisory Council of the National Association before it took up the problem of housing. It was his judgment that, probably, the housing problem was the more important one. This, no doubt, is true.

I am of the opinion that we shall find in a great number of the large

factories of this country, and also in many of the smaller ones, that, on the whole, the conditions in the work shops are more sanitary than are the home conditions of many of the workers.

Of course, there is this thing to be taken into account: it is easier to approach the factory management and get something done, because you have a smaller group to deal with; you have men in absolute control of the situation who can do as they desire, and they have the intelligent self-interest to which you can appeal. These are advantages which we do not have in trying to get housing reform, as we must appeal to the whole community with its many conflicting interests and ignorance.

Possibly the real reason that a discussion of working conditions was taken up by the Advisory Council in advance of Housing was the fact that the tuberculosis movement of necessity must endeavor to find solution of some of the tuberculosis problems. One of the most important of these was the discovery of the incipient cases of tuberculosis.

Several speakers have emphasized the fact that the worker stays on the job until the very last minute; he stays on his feet and keeps going as long as he can, disregarding the fact that he is sick and not in working condition; he does not want to lose his wages, and so, by the time he is forced to seek treatment he is too far gone to be able to do much for him.

The introduction in working places, therefore, of a method of examination of all employees and a constant supervision of their health makes it possible to discover tuberculosis in its earlier stages, and this is apparently the only method by means of which this can be brought about. So long as the workers are left to seek medical advice of their own initiative, they will put off the examination too long. This has been the standpoint from which this problem has been attacked by us in Chicago. We were striving for a method to discover incipient cases. The pamphlet issued by the National Association on "Working Men's Organization in Local Anti-Tuberculosis Campaigns" discloses that efforts put forth by the various working men's organizations have been looking to the relief of the patient and family after the disease has developed. Our efforts put forth in Chicago therefore have been along lines a little different from those indicated in this report just issued by the National Association.

The Chicago Tuberculosis Institute put itself into this problem by appointing a Factory Committee. This Committee did not originate anything particularly new. It saw the problem as it existed and that various means had been undertaken to meet it, its work, therefore, was to bring together the various forces in the community who were thinking along these lines and get them to work out some method of systematized and organized work.

The principal problem that the Institute set itself to do was to find a method to discover the incipient tuberculosis cases. Dr. Hatfield in his address has just spoken of the great necessity of this thing being attained. I believe that we have gone a long way in many of the industrial establishments in Chicago to bring this about, and many of the firms have gone so far as to provide places for the care of these cases when they are found.

Five cottages have been built at Edward Sanatorium by five different industrial concerns in Chicago.

Some concerns have gone so far as to demand (which of course cannot be done in any way by the voluntary organizations of workers) that men and women must undergo a physical examination before they are employed, for the reason that the health of those already employed must be guarded and that people suffering from communicable diseases must not come into the factory to endanger the workers already employed. On page 25 of the pamphlet on Working Men's Organizations to which Dr. Hatfield referred, mention is made of the fact that there are two points of weakness in the plans discussed in that pamphlet.

First, is the lack of machinery to discover early cases of tuberculosis, and, second, the lack of continuity of effort. These two short-comings I have shown have been met by the industrial concerns in Chicago which have introduced a systematic supervision of the health of employees, but there is a third point of weakness which has not yet been met by any system and that is the lack of universality.

Now I am of the belief that in the development of almost any line of effort we must resort to private initiative first. Private initiative must discover many of the problems, plan remedial methods and establish standards. In the long run, however, if we are going to extend benefits and make them universal, this can be brought about only by community or governmental action. So if we wish to extend benefits of medical examination and supervision to all the workers of the country, we must obtain some sort of public universal and compulsory health insurance.

I find myself undergoing considerable turmoil in my mind and probably change of attitude towards many public problems different from what I had some years ago on account of the experiences we have been going through in our work in Chicago.

Last year at the meeting of the National Association at Seattle I read a paper on " The Duties and Opportunities of the Local Tuberculosis Associations." It was in July, just a short time after the inauguration of our present city administration. There was considerable apprehension in the minds of the Chicago workers as to just what we could expect from the new administration, and I set forth some of my misgivings in that Seattle paper, to such an extent that some of my friends asked me if I did not have a bit of indigestion when I wrote that paper. I think subsequent events that have happened in Chicago have fully demonstrated that instead of indigestion it was a case of foresight, only we have had to go through more tremendous difficulties than we could possibly have foreseen.

The problem is simply this,— when we turn over great enterprises to the community to carry out, how is it going to work? And who is going to administer the undertaking? Back of all this is the real question which is, are the people of this country intelligent enough for self-government? I find many men in Chicago asking this question at the present time. We believe that we worked out in Chicago the most complete municipal

anti-tuberculosis program of any city in the world. Now it has been necessary to organize a Committee of One Hundred as a vigilance committee to watch the public officials to see that they do not steal everything in sight. Are the people of any community intelligent enough to select proper officials for any great number of consecutive years so that any kind of program could be outlined and followed out to its completion? Have the people of this country enough intelligence to select men to administer public problems with ability, intelligence and efficiency? The present city administration of Chicago will not. I tell you that the death of Dr. Sachs is a challenge to the people of this whole country. Is it safe for a man to devote himself unselfishly to the interest of the public? Will he be able to plan a great work and see it brought to its completion or is he going to be hounded to death by a bunch of political grafters after years of self-sacrifice and devotion to the public good? This is a question that has got to be settled before we can expect public institutions to be administered efficiently. Whatever great work we may plan for the benefit of the community, we must always tremble for its fate when its administration is turned over to public officials.

PRESENT STATUS OF MEDICAL EXAMINATION OF EMPLOYEES

By Harry E. Mock, M.D.

Chicago

Preventive medicine and preventive surgery has within the last few years become a very active factor in the industrial life of our country.

Our modern industrial concerns have employed experts to study their expensive, complicated machines in order to preserve their mechanism, to facilitate smoothness of action, and to obtain their maximum of efficiency. The *human machine* alone was neglected. Gradually, a new, humanizing influence pervaded a few of these industries, and they began to consider the "welfare of the employees" from various angles. It was soon apparent that this movement reacted to the "welfare of the employers," and that good business sagacity demanded the continuance and extension of this work. Thus was born an entirely new economic viewpoint, which is rapidly extending to every branch of our industrial life.

The *conservation of life,* by the prevention of disease and accidents among employees, is really the fundamental motive back of this combined welfare movement. Therefore, to the company surgeon of to-day is given the opportunity of extending medical science into an entirely new field.

Seven years ago when we started this work of medical examination of employees in connection with the recognized routine work of the company surgeon, it was an entirely new idea to both the medical and industrial worlds. True, sporadic instances of medical examination of employees for special conditions had occurred previous to that time, most notable of which was the work of Dr. Frank Fulton in 1906 when he banded together a few industries of Providence, R. I., and examined for tuberculosis any of their employees who desired it.

Two years ago at the Symposium on Medical Examination of Employees held before this association under the leadership of our late Dr. Sachs (whose enthusiasm and vision extended this work more than that of any other man), it was brought out that a few concerns throughout the country had adopted a similar plan in varying degrees.

Last September I had occasion to investigate this subject quite thoroughly and I found almost 100 large industries throughout the land were supervising the health of their employees by some plan of medical examination. Some were examining every old employee, others were examining both the old working force and every applicant for work, while a few were inspecting the employees by either a doctor or a nurse and were then giving a thorough medical examination to those found suspicious by this inspection.

Thus, the present status of medical examination of employees with regard to the extension of the plan shows conclusively that it is growing rapidly in favor with the far-sighted business men with whom we must deal, and therefore it must contain something of real value.

It is now the duty of the physician and the sociologists to show that *the benefits to the employer are in direct ratio to the thoroughness and completeness of the plan which he adopts for the supervision of the health of his employees.*

Before any plan is adopted by the business world, it must be positively demonstrated that it contains *real benefits* either to the *employer* or to the *employee,* or better yet, to both the *employee* and the *employer.* And when we can demonstrate in the case of a number of industries that these benefits are likewise extended to the *consumer,* then we have the most ideal arrangement and the strongest of arguments in favor of our plan. We have been neglecting this last argument. What greater advertisement does an industry want in this day of preventive medicine than to say, the food which we supply you, the clothes which you wear, the furnishings for your home and your work are handled by a force of healthy employees uncontaminated by any contagious disease?

The thorough medical examination and re-examination of each individual is the chief aid in supervising the health of any group of people in intimate contact with each other; therefore, every employee in the active working force should be examined for the following purposes:

1. To ascertain the condition of health of each employee and to give personal advice to those who need it, along the lines applicable to their cases.

2. To discover diseases among the employees in the earliest stages and therefore while still curable. Many diseases of which there was no knowledge are thus discovered, and the afflicted employee is advised as to methods to overcome the trouble or at least to prevent its advancement. Many of these are referred to the family physician months before they would voluntarily seek his counsel.

3. To find any one who has contracted a disease that might be communicated to a fellow employee. Tuberculosis is the chief of these diseases. Not only is the working force protected from contamination, but the disease is usually found in such an early stage that practically always a cure is possible.

4. To discover the chronically diseased employee who is still able to work, and to recommend for him a position where he will be efficient and which will not hasten the course of his disease. Thus, the man with organic heart disease would be an inefficient heavy trucker and such work would be of great danger to his life, whereas he would make a good "straw-boss" or light packer — positions which would enable him to control his disease.

Likewise, the medical examination of all applicants for work should be made, not for the purpose of choosing only the strongest, healthiest

workers — such a plan would be too great an injustice to our weaker fellow-men — but for the following reasons:

1. To prevent those with contagious diseases from mingling with our healthy employees.

2. To prevent those with serious diseased conditions from going to work, for their own protection.

3. To choose the proper type of work for those with some chronic disease which does not totally unfit them.

Next in importance to the medical examination in supervising the health of the working force is the personal contact between the doctor and each employee, which enables him to advise concerning all matters of health and means of prevention which are suggested by their individual cases. Thus, they are told when a diseased condition is present and how best to overcome it and when they should consult their family physician. They are warned against wrong lines of treatment and the dangers of consulting quacks and advertising doctors, and the uselessness of taking patent medicines.

Some of the results of a thorough system of medical examination of employees and applicants for work extending over a period of several years in a large industry employing between 12,000 and 13,000 persons is the best means at hand to demonstrate the worth of such a plan. First, the absolute confidence of the employees is a prime necessity in the success of this work. The following table shows that we have gained this confidence, for a great majority of the visits to the doctor's office are left to the discretion of the employees:

Year.	Number Employees' Visits to Doctor's Office
1909	14,643
1910	17,889
1911	17,637
1912	24,912
1913	46,357
1914	67,919
1915	76,569

Naturally, this has meant a gradual increase in the medical and nursing staff from a four-room office with one doctor and two nurses in 1909 to an eighteen-room office with six doctors and twelve nurses in 1915. Our doctors give half their time to the work.

Approximately 30 per cent. of the above visits to the doctor's office were surgical cases. From the remainder we have made 35,878 general examinations and 85,141 inspections and partial examinations. During the last two years, a period covering a marked extension of the work, we have made 28,915 general examinations, of which 15,151 were employees in active service and 13,764 were applicants for work.

In the examination of applicants for work, 19.9 per cent. had definite diseased conditions, *but only* 3.4 *per cent. of these were rejected for employment.* In every case a rejection was made only when the applicant

had some diseased condition which made work at the plant detrimental to him, or some contagious disease which might be spread to the active working force.

To me this is the strongest rebuttal we can possibly give to the arguments advanced by certain leaders of labor unions in this convention two years ago, against the medical examination of employees.

Out of 13,000 applicants examined for work, 19.9 per cent. were found with diseased conditions, but only 218, or 3.4 per cent., were rejected — either for their own protection or the protection of the old employees. We recognize that unscrupulous employers could adopt such a system for the elimination of all but the very healthiest of employees, or for the elimination of undesirable employees among the union help. We also recognize that when such a system becomes more universal, great hardships will fall upon the 3 to 5 per cent. physically unfit employees who are unable to secure employment because they cannot pass the medical examinations.

These very possibilities bring us face to face with another problem which must always go hand in hand with any system of universal supervision of the health of employees, viz., either State or federal control of such a system and either State or federal health insurance laws, insurance against non-employment, and old-age pensions.

15,151 old employees have been examined during the last two years. 27 per cent. of these were found with definite diseased conditions, while a great number of very minor defects were found but not classified. None of these employees were discharged, but they were advised as to the best methods to overcome or control their diseases, many were given vacations, or free hospital or sanatorium care, others were referred to their family physicians, or when investigation proved they could not afford to pay for special care, this was rendered to them free of charge by the medical staff. Whenever the work of an employee was found to be detrimental to his health, he was transferred to some other position; as a rule his health improved and he became a more efficient employee at once. The increased efficiency of the workers resulting from correcting a great many of these diseased conditions cannot be accurately measured, but it has undoubtedly paid a large share of the expense of this medical work, and from a humane standpoint it is impossible to estimate its value.

The best example of the results of medical examination of employees is shown in the reduction of pulmonary tuberculosis.

TUBERCULOUS CASES FOUND BY MEDICAL EXAMINATION OF EMPLOYEES DURING A PERIOD OF 6 YEARS

Total Number Cases of Tuberculosis found	499
Stages of the Disease:	
First, incipent	423
Second, moderately advanced	48
Third, far advanced	28
	499
Total Number Cases cared for by Company	284

Treated as follows:

In Sanatoria	107
Home Treatment	125
Sent to various parts of country	52
	284

Results of this Treatment:

Cured and back at work	123
Arrested and either at home or at outside employment	69
Still under treatment	19
Working or under treatment elsewhere	53
Deaths	20
	284

The remaining 215 cases were mostly among recent employees or applicants for work. These were referred to the family doctor or to the Chicago Tuberculosis Institute or sent directly to some sanatorium at their own expense.

Of the 499 cases of tuberculosis found 20 have died. Eighteen of these were advanced cases when discovered; two were early cases, but refused to recognize the disease or to accept any form of treatment. Ten of these deaths occurred the first two years of our work, the remaining 10 during the last four years. The death-rate from tuberculosis is rapidly decreasing as the number of examination of employees increases. Thus, in 1909, the percentage of deaths among those found tuberculous was 11 per cent., while in 1914 only 2 per cent. died.

One of the most striking results of this tuberculosis work is shown by the following figures: In 1909, this industry had 1600 five- to twenty-year employees; during that year 33.1 per cent. of the 45 cases of tuberculosis found were among these old employees. In 1914, there were 4200 five- to twenty-year employees: during this year 13.8 per cent. of the 155 cases of tuberculosis found were among these old employees. This 20 per cent. reduction shows conclusively that we are gradually stamping out tuberculosis from among the old working force.

During the last two years, 71 cases of pulmonary tuberculosis have been found in applicants examined for work. The prevention of these 71 sources of infection from mingling with the active force has been of the greatest value in accomplishing the above results.

As stated before, the present status of medical examination of employees must depend to a great extent upon the benefits, either direct or indirect, derived from such a system by the employers. Concerns which have installed medical departments for the good of their employees have, as a rule, installed other forms of so-called welfare work, have improved the sanitary conditions of the work-rooms, have good restaurant facilities, and playgrounds or gymnasiums for the use of their employees. Thus, it is impossible to say just how much any one branch of this welfare work has been responsible for the increased efficiency of the working force, for the improved attendance of the employees, and for the increased good will of the workers toward the management. Nevertheless,

we can point out the following as examples of where the Medical Department has most emphatically paid:

1. Decreased loss of time. In 1914 there was a 28 per cent. increase in the membership of the Benefit Association as compared with three years previous. In spite of this increase, there was a decrease of 40 per cent. in the amount of sick disability.

2. Examination of applicants *reduces the cost of hiring* by eliminating those who would be forced to quit because of health reasons soon after employment. Saved, for the employer, the cost of employing them and the cost of teaching them their work — estimated by some to represent an average of $35.00 per person.

3. Increased efficiency due to choosing of positions. The old plan was: Applicant with unknown heart disease; placed at heavy trucking; inefficient; broke down and quit; heart condition made worse.

4. The removal of the man with organic heart disease, or kidney trouble, or other chronic disease that has reduced his efficiency for his regular heavy work, and placing him in lighter work where he can again become efficient.

5. Greater number of old employees, with their constantly increasing value, due to reduced permanent sickness and death-rate.

6. The steadier working force increases output; less changing of force decreases cost of hiring.

7. The 20 per cent. decreased efficiency of the man with a rupture, and his increased efficiency after it is discovered and repaired.

8. Medical examination by discovering the sick, deformed, or impaired employee is the best form of *accident prevention* at the disposal of the employer.

CONCLUSION

This system of industrial medicine and surgery is the greatest socializing influence in our modern political and business world. Humanitarianism is the sum and substance of this, what we may rightly call, medio-sociological propaganda. If we persist in our preaching and our action, we shall soon have all elements of humanity working with us for the extension of this plan. We shall have

The employee fighting for it;
The consumer demanding it;
The employer gladly granting it;
and
The State forced by it to care for the unfortunates who are found with diseased conditions that incapacitate them.

DISCUSSION ON PAPER BY DR. MOCK

Dr. John H. Lowman, Cleveland: The comprehensive manner in which Dr. Mock has covered the ground leaves but little need for discussion of this subject. His opportunity has been very great because

in no place is the systematic examination and care of employees so thoroughly carried out as in Chicago. A year ago the Chicago Tuberculosis Institute gave opportunity to several visitors to that city to inspect the system in several large industries and one could easily see that it was complete. There was in some places a well-equipped hospital dispensary, a staff of several physicians and nurses who gave almost all their time and had complete records of their work. The cost of installing and carrying out such a system is very great, but the statement was made that this expenditure was more than compensated by the protection of the men and also by the protection of the corporation.

This fact that the corporation does not suffer, but has great potential advantages is becoming more and more evident to employers.

In one factory that employs a thousand men this recently became evident to the management; and in consequence thereof they have a thorough examination of their employees. This company is well conducted; the offices and shops are exceedingly sanitary; the type of men employed is of a high order and every year a certain share of profits is distributed to the men. The hours are satisfactory and the men contented.

The superintendent noticed that one of the old employees was less keen in his work and occasionally slept on his job. He treated the man kindly, remembering his past services and was easy with him. One day the man cut himself on the arm. He carelesly wiped the blood away with soiled waste. Speedily he had a violent infection, an elusive cellulitis followed, and the man died, and the heirs sued for damages. It was found during the illness that the man had diabetes with a very high percentage of sugar. The diabetes was probably the cause of the apathy of the workman before his injury.

A watchful, intelligent care would have minimized the responsibility of the company. An extensive system of examination by physicians, an inspection by nurses and first aid relief has been installed by the company for its own protection.

The examination of employees at the beginning of their work will naturally detect many cases of sick and defective men, but this number will diminish with each year until what might be called a normal ratio will be reached — there is need in this weeding out of the weak for careful adjustment so that no injustice be done to the men. If a liability insurance exists the company will strive to secure sound men for their own protection.

Thus men with but one good eye would be looked upon as dangerous risks, because if the man hurts his well eye and becomes totally blind the damages are very high.

If he has a well compensated heart or a completely arrested tuberculous lesion, or hypertonus or certain gastric disturbances, he might easily be refused work, although he might be an excellent workman.

There should be, therefore, a well-devised health insurance that would work with examination of employees. Each system is essential to the just working of the other.

At present there are but few places where workmen are examined thoroughly on beginning work. There are some shops where the men are asked questions about the health but not subjected to physical examination, there are many who have a social service department where illness is more or less quickly detected. There are some cooperated systems where employed and employer combine to care for the consumptive, but there is no standardized method. A study of the workman's health associations shows that workmen will pay more readily for the support and care of needy workmen suffering from tuberculosis, and it also shows where workmen's societies for the aid and detection of tuberculosis are active. The sanitary condition of the shop has notably improved and the health of the men has improved. There is less spitting, more use of cuspidor, cleaner floors; lavatories are better and more carefully used: there is more interest in the health of the fellow workman. There is nothing that a workman will listen to more eagerly than instruction and advice on these points.

It seems, therefore, until that time comes when there is a national law for the examination and care of workmen that the private societies can not do better than to begin by the detection and care of the needy who have developed tuberculosis and then proceed from that point to more general endeavors.

Dr. B. S. Warren, U. S. Public Health Service: I did not have Dr. Mock's paper before me when I was preparing my discussion of his paper, so I have just written down the thoughts which were uppermost in my mind, at the time. This paper, therefore, cannot be considered in any way a criticism of Dr. Mock's work for the Sears-Roebuck Company.

Since the enactment of workmen's compensation laws in so many States, medical supervision of industry has become very popular. It has been introduced into many establishments as a measure for self-protection. After introduction into the official staff of the industry in the capacity of medical examiner, the industrial physician has more than justified his claims to place.

He is educating the employer and employee in matters of health and sanitation. He is finding incipient diseases before it is too late for cure. He is advising employer and employee so that the man is fitted to his job or the job adjusted to the man's capacity. As he becomes more familiar with industrial conditions he will advise managers that there is an optimum of hours of labor, speed, rest, recreation and nutrition for the wage-earner, which if adhered to will bring the output up to the maximum of quality and quantity. He will see to it that hygienic standards are the standards of the establishment and that a man is too valuable a part of the industry to be treated as a machine selected only on a basis of fitness and scrapped when worn out. If medical supervision of industry does not abolish hours of labor, speeding, and other working conditions which cause excessive fatigue and if it does not promote working conditions which will make possible healthful standards of living,

then medical supervision will have failed and it were better that the physician had never entered this field.

Some idea of the extent of this movement for medical supervision and the rapidity with which it is gaining ground may be had from the report of Industrial Commission of Ohio.* The investigation showed that prior to 1914 very few establishments other than railroads and street railways conducted physical examination of employees. The investigators reported data for four establishments employing approximately 11,540 persons which began prior to 1914 and 25 employing approximately 42,387 persons which began in 1914. This total of approximately 53,927 included 49,828 males and 4,099 females. The report goes on to state that these examinations were made of most applicants for employment and that 12 of the establishments required examinations of employees. Complete records were not available in all establishments but where available they showed for 1914 that 23,118 applicants were examined for employment and 1,040 or about 4.5 per cent. were rejected on account of physical inefficiency. Six establishments requiring examinations of employees and keeping records showed, for 1914, that 8,054 were examined and 791 or 9.8 per cent. were found physically unfit for the work at which engaged at the time and that 118 or 1.4 per cent. were discharged following the examination.

These results no doubt, effect a material saving to the establishments and procure a more efficient working force with a consequent increase in output.

The examinations are also no doubt of great value to the employees, but owing to the fact that they are done by physicians in the employ of the company the results are called into question by some employee groups. Except for the ethical standards of the medical profession and unusual freedom from bias on the part of physicians employed for this purpose it is probable that there would have been a more serious opposition to these physical examinations on the part of employees.

In spite of these objections and any abuses which may have crept in with the inauguration of physical examination in some establishment, all parties interested may as well recognize the fact that medical supervision of industry has come to stay. There is too much that is good in it for all concerned for it to be discarded. Its value is too well proven for any objections on the part of any group to prevent its further adoption. It probably has its serious defects but wisely administered it should prove to be of extraordinary value in conserving the health and lives of the workers and in increasing the output of industry.

With the benefits of such a system so well recognized those industries adopting it, especially the physicians, should realize that many abuses are liable to creep in. This is especially the case where the managements and the company physicians have only the employer's viewpoint. Present organization of industry hardly permits of any other practicable method

* Bulletin of the Industrial Commission of Ohio, Oct. 7, 1915, Physical Examination of Wage Earners of Ohio in 1914, pp. 5 and 6.

of medical supervision except that provided and paid for by the management. It is true that the garment workers of New York City have provided a joint board for sanitary control of the industry but such instances are few and are only possible with competent organizations of employers and employees. Even in the case of the garment workers there is always the danger of disagreement and the constructive work of years being swept away. Even in such a joint supervision there is always the problem of what is to become of the physically defective who cannot be fitted into any kind of employment in the industry, or who are fitted in at so much lower economic level as to leave him unable to support himself and family.

The rapid extension of physical examinations prior to employment by the big industries is going to make it increasingly difficult for the physically defective to find a job, and it must not be forgotten here that old age, and many times age above 45, is coming to be classed as a physical defect.

The result is that the defectives will hesitate to leave one employment in search of a better one, or if thrown out of employment they will often be forced to accept another at a much lower economic level and in the end, unless he has long and faithful service to his credit, he will find himself among the group of unemployable, and dependent upon others for support.

There is another problem which presents itself: Under present conditions the wages paid are for the average worker and this average includes the defectives. When these are eliminated and only the physically fit are considered, it is evident that managements are going to increase the standards for the day's work. Whether this will result in an increase in wages is of course, an economic question to be settled by employer and employees, but the whole question of medical supervision is a health question as well as an economic one because of the fact that this method of selection is liable to increase the number of unemployable. As time goes on the examinations are going to be more searching, and it is possible the upper age limit will be lowered so that the unemployable will reach numbers at present not even imagined. Such will probably be its effect unless something is done to prevent physical defects and to prevent men from becoming prematurely old. In view of this expectation some solution of the problem of the physically unfit should be worked out now. To this end the interested groups should get together and endeavor to find some plan which would provide for proper relief in a way that would be adequate without any taint of charity or paternalism being attached to it, and at the same time provide for a comprehensive plan for the prevention of disability.

It is fairly well recognized that the groups interested in this problem are first the employees themselves, upon whom rest the greater responsibility; second, the employers with probably somewhat less degree of responsibility; third, the public with a community responsibility; and fourth,

the physicians who have the responsibility as related to their work as family physician, as company physician, or as an employee of the health departments.

There is probably one plan which will effectively bring all of these interested groups together in a common effort to take care of this situation with a proper guarantee of permanency: A governmental system of "Social Insurance." Properly adapted to our federal and State governments such a system would provide that: (1) all workers, even the lowest paid, be entitled to the benefits; (2) the benefits financial and medical be adequate; (3) the funds be provided in equitable ratio by the employees, and employers with some appropriations by the federal and State governments to meet expenses of supervision and cost of disability-preventing measures; (4) the administration be representative of the four interested groups and so coordinated with other agencies for the relief and prevention of disability that the best results may be obtained in preventing disability and premature old age. Such results would produce a future generation of physically fit people prepared for any emergency of peace or war.

Dr. Frank Wieland, Chicago: We employ at capacity, 8,000 men and women. Every one who is taken on, is inspected. This is a superficial examination, and tends to exclude only those who are obviously unfit, the unclean, those under weight, and among the men, those who are ruptured. On the first of July of each year, all who are at work pass into the Company's insurance. Previously, every employee must pass a physicial examination, as complete as that required by any insurance company. Those who are not fit physically are let out. The idea is to have only those in good health in our employ. The insurance, which is a gift to the employees from the firm, covers all sickness of any sort whatsoever, all accidents, hospital expense, all surgical operations, the cost of all appliances, in fact, everything that is involved in sickness. Our staff consists of five physicians, five nurses, and four dentists. There is also an Efficiency Department, and a Welfare Department, that concern themselves with the social economics of the workers.

Any one who watches workers knows that there comes a slump in efficiency at about ten in the morning, and again at about three, in the afternoon. To obviate this downward curve, it occurred to us to serve every employee who desired it, a twelve ounce glass of malted milk, double strength at these two periods each day. A fifteen minutes' recess is given for this luncheon. The results have been illuminating. We have been able almost to discontinue the use of tonics and stimulating drugs. Out of a room containing many hundred girls twenty were chosen at random. In six weeks, the least gained under the use of the malted milk was ten pounds, and the most, twenty pounds. As they improve in resistance and weight, they become less liable to infections of the tubercular type. Our main object, in all of our work, is to stamp out tuberculosis.

No sick person is ever discharged from work but no person of questionable health is ever employed. We care for our tuberculous at sanatoriums or supply them with sleeping porches at their homes.

Dr. C. W. Crankshaw: At the December meeting of the New Jersey Sanitary Association, I read a paper on "The Practice of Hygiene and Sanitation in Business," stating practically all that our Company is doing along the lines of medical examinations and welfare work. If any of you are sufficiently interested, and will write to me or let me have your name after the meeting, I will arrange to send you one of these reprints.

I desire to state that in our Company, medical examinations of employees have been going on for over a period of five years and I can concur with Dr. Mock that the employees are glad to come to the Infirmary or Hospital to consult us and are anxious to know if they are physically able to work. They are also contented, knowing that there will not be any one closely associated with them that is sick, has pulmonary trouble or any infectious disease. At the Prudential we are equally careful in regard to taking care of what Dr. Mock calls partially defective cases; some cases with valvular heart murmur, etc., should not be employed doing heavy lifting, etc. Electricians, elevator men, window cleaners, etc., should not continue such employment if they have heart disease or tendency to dizziness. Many who are slightly impaired physically are unconscious of such impairment but are strong enough to work in some capacity and should be told how to conserve their health. Such persons may be employed as clerks where they are required to sit at a desk or do some similar light work, and in that way they would not be excluded. It is gratifying to hear the doctor from Montgomery, Ward and Company of Chicago tell what they are doing in furnishing malted milk to the employees in the morning and afternoon.

Since writing the paper referred to a few moments ago, our Company decided to give the employees a short recess for rest and recreation at half past ten in the morning and half past two in the afternoon. The windows are thrown wide open and they walk about the departments or corridors and take some form of light calisthenics. Cases that have returned to duty from the hospital or their homes, where they have been ill or had a surgical operation, may have slight pallor or a tendency to anemia. They are sent to the rest room at 10:30 in the morning and 2:30 in the afternoon and are given egg and milk or milk alone, as they desire, prepared by the nurse who has charge of such cases referred to her. There are a great many things that have been planned and put into operation for the welfare of the Prudential employees along the lines of conservation and preventive medicine but time will not permit me to tell you about all of them this afternoon. Since the plan for disability, service retirement and sanatoria allowances, as announced by President Dryden in 1913, has been in operation, the benefits to the employees have been greatly appreciated by them. When the employee is disabled, the regular compensation is paid according to the length of

service. The length of service also determines the sanatoria allowance. The plan affects the four thousand home office employees and about thirteen thousand industrial field employees. Employees who have been in the service a year or more enjoy at least two weeks' vacation and those clerks who have been employed twenty years or more enjoy as much as a month's vacation. As a rule, time off on account of disability does not affect the regular vacation.

ELEVENTH MIDWINTER MEETING OF THE AMERICAN SANATORIUM ASSOCIATION

The morning session was called to order at 10:30 A. M. by Dr. Vincent Y. Bowditch, President, who then spoke of the great loss which had come to the Association and the anti-tuberculosis world since the last meeting, in the death of Dr. Edward Livingston Trudeau, and said that Dr. Lawrason Brown had consented to speak a few words in memory of Dr. Trudeau.

Dr. Brown: "Ye who listen with credulity to the whispers of fancy and pursue with eagerness the phantoms of hope, who expect that age will perform the promises of youth and the deficiencies of the present day will be supplied by the morrow, attend to the history of Rasselas, Prince of Abyssinia," wrote many years ago the crabbed and garrulous old Dr. Johnson. You will recall the history of Rasselas, the many discourses, the vain search after happiness and finally the speech of the young prince when he discovers that in spite of the felicities of the Valley, he is not content with it, nor with himself. Comparing himself to a beast, he says, "I am hungry and thirsty like him, but when thirst and hunger cease, I am not at rest. The intermediate hours are tedious and gloomy; I long to be hungry again that I may quicken my attention." I have chosen this text for the very contrast it presents to the life of Edward Livingston Trudeau.

A young man, broken down in health, which he sought first in the South, then in the Middle West, returning finally some forty years ago to the Adirondacks, a scene of many former hunting trips. He no longer listened with credulity to the whispers of fancy; and the phantoms of hope and of fame in his profession, which he thought he had left behind him when he entered the great Adirondack Wilderness, were forgotten.

But destiny fits us for our work, often in no easy mold, and like the pioneers among whom he was forced to live, he soon acquired the habit of striking out on unbeaten paths. Accordingly, some years later on a barren hillside among rocks and scattered evergreens he planted a cottage on a little tract of land purchased for him by a few of his friends. It has always seemed to me especially fitting that this first bit of land was presented by men who themselves were not overburdened with riches. A few friends supplied the funds to maintain the baby institution, and so was born in 1884–1885 the Adirondack Cottage Sanatorium. Its history from that day to this is too familiar to all of you for me to mention.

An insight into his character may be gained when it is known that many of his friends urged him to build a private institution, offering to furnish him with the money, which he refused.

I would recall to you that age in this instance did perform and doubly perform the promises of youth. Many a dark day occurred, when the

clouds showed no rift, and when the silver lining of both clouds and purses was long obscured. Many a day, I have heard, as he slowly drove down the hill leading to the river, on the way to the village of Saranac Lake, he wished for dynamite enough to blast this ambition of his. But here again I would recall that the deficiencies of the present day were supplied by the morrow.

One more reference to my text and I am done with it. The whispers of his fancy, the phantoms of his hope, and the promises of his youth erected the first sanatorium in the world where those whose income was insufficient to meet heavy expenses which a residence in the mountains entailed, where these, I say, might seek and obtain renewed health, where the age of disease could bathe itself in the spring of cure and come forth in the youth of recovery and health. But again he wrought another change in our text for he created a place where happiness reigns, where hunger and thirst cease and where, when such is the case, rest is eagerly pursued. I am not wrong, I am sure, when I say that thanks to him the intermediate hours are neither tedious nor gloomy and the return again of hunger is welcomed with delight.

The enthusiasm which rendered all this possible establishes but again the truth of the old saying that those whom the gods love die young, for surely at whatever age death overtook such a man, he died young. "Death has not been suffered to take so much as the illusion from his heart."

The Adirondack Cottage Sanatorium is a great autobiography, writ in characters more enduring than those found in books, clearer and more inspiring than those massive structures of the Orient, for *they* consumed life in *their* construction, while *these* preserve it. This biography which so clearly portrays the man that when one asks what sort of a man he was, this you can say: look and see! and behold thousands, some of whom are here to-day, give their answer by their lives which he gave back to them. In years to come when those of us who have known him face to face have also joined the innumerable caravan that moves to that immortal realm, many others will come and, marveling at the work accomplished, seek to know the man, and on that hillside, among the group of cottages where many hundreds have and will continue to rise up from beds of illness to call him blessed, will be found his spirit which, after all, is the real man.

He sought a cure for tuberculosis and found it not. Discouraged? Never for a moment. His friend Stevenson could have had him in mind as he wrote: "A strange picture we make on our way to our chimæras, ceaselessly marching, grudging ourselves the time for rest; indefatigable, adventurous pioneers. It is true that we shall never reach the goal; it is even more than probable that there is no such place; and if we lived for centuries and were endowed with the powers of a god, we should find ourselves not much nearer what we wanted at the end. O toiling hands of mortals! O unwearied feet, traveling ye know not whither! Soon, soon, it seems to you, you must come forth on some conspicuous hilltop,

and but a little way further, against the setting sun, descry the spires of El Dorado. Little do ye know your own blessedness; for to travel hopefully is a better thing than to arrive, and the true success is to labor."

One word more and I am done. Some years ago a frail little body, resting for several months in the Child's Memorial at the Adirondack Cottage Sanatorium, came to know this man. A few years later she expressed her feelings in a little sonnet, feelings which so nearly coincide with my own that I want to read it to you to-day.

"Of infinite compassion, vision keen,
Great mind and greater heart — of purpose high
That lifts his work to heights of majesty,
Above all motives commonplace or mean:—
His life is pledged to combat. As of old
Fought Arthur and his knights against the sway
Of murderous hordes, he strives to keep at bay
A foe more deadly, pitiless and bold,
That spoils our land, and no condition spares.
The changing seasons mark his changeless aim.
Highest and lowest alike acclaim
Their champion as steadfastly he fares.
Unresting, self-regardless, on his quest,
By all who knew him, loved, revered and blessed."

Dr. Washburn: I cannot allow the note in the Secretary's report on the death of Dr. Huddleston to go by without voicing the regret which I am sure all feel. Dr. Huddleston was a warm friend of mine, a contemporary of mine in the medical school. He was a senior house surgeon while I was a junior. He was a man of magnetism; a man of genial and wonderful presence, and in his death I feel a personal loss and wish to enter my personal tribute on the records.

Dr. Edward R. Baldwin: A committee was appointed at the last meeting of the National Association with instructions to formulate some method of trying to stimulate laboratory and other research work. One thousand dollars was appropriated for the purposes of this committee, not wholly for the purpose of subsidizing workers, but chiefly for publicity and for its expenses. I was appointed chairman with instructions to select my own associates, and the men whose names appear on the circular are the gentlemen who have consented to serve.

The objects are to bring together the men who are qualified and desirous of doing some work and those who are able to support it and those who are friendly to the tuberculosis work and the anti-tuberculosis movement and who may be interested in research and give it official recognition and encouragement, which cannot be done by the workers themselves. It grows upon me that there are possibilities in this at the present time, and this Association ought to be interested in them.

We have not made any really valuable advances in the last twenty years or more, but are pursuing the same routine. Many little points have been improved, but the fundamentals have not been changed and may never be changed; but such research work is in line to increase our knowledge and give us points of value. The very fact that men are interested in institutions without any stimulus except that of routine work, is evidence of

enthusiasm, and if such work can be started in these institutions or their laboratories, it may stimulate them to do still better work and be more enthusiastic in doing it. Not every sanatorium physician is qualified or has the taste for it, but there are many who have special fitness along either physiological, chemical or bacteriological lines, or in statistical studies during their college course or as post graduates.

The circular letter was prepared for the purpose of getting such men and laboratories, and to ascertain what they would be willing to do. If we can get these figures and information as to certain workers, this committee is prepared to use its influence to raise the money required, either in the neighborhood of the institutions or elsewhere.

Moreover, this might be the means of transferring much of this work from Germany to the United States. Such work is now practically suspended in Europe. Many of the men who are doing it are dead and many of the laboratories are closed. An effort is being made to keep it up, but it is being done in Germany by the older men and those who are not particularly capable. The duty of the United States is to keep it up and put forth more research. In fact, if we wish to maintain the present interest of the public in the subject, we must broaden scientific standards and secure their sympathy and support. Many persons, physicians, etc., are already disappointed in the results of sanatorium treatment. They expected too much from it. We cannot offer anything better to-day, for we have not the money and the laboratories to do better or to develop our research, but if we can get the money, much can be accomplished. I hope the Association will become interested in this particular field.

Copies of this letter will be mailed to every sanatorium.

President: Another circular has been sent to the members of the Association as an added subject for discussion to-day. It concerns an important matter extremely difficult to satisfy every one about. However, Dr. Rathbun's suggestion is not to change the whole scheme of classification, and is simply offered for consideration and not for definite action, which can be taken, if it seems advisable, at the next Spring meeting.

Dr. Walter L. Rathbun's suggestions as to the different use of the present classification were offered as follows:

THE CLASSIFICATION OF PULMONARY TUBERCULOSIS

It is evident from the literature that a satisfactory classification for cases of pulmonary phthisis has been, for a great many years, a most perplexing problem to the men interested in the study of tuberculosis. The present classification of the National Association (Transactions Vol. 9, 1913) while possessing a great many valuable features, is in some ways very unsatisfactory and has been a source of confusion to many men in sanatorium work. I have no intention of suggesting more than a rearrangement of the existing classification. It would seem advisable, however, to separate the extent of the lesion and the symptoms in the present scheme.

The following is a suggested modification of the classification now used. It contains the same terms used in the present scheme with the exception of those enclosed in parentheses.

PHYSICAL SIGNS	SYMPTOMS
	INCIPIENT
STAGE I.—Slight infiltration limited to the apex of one or both lungs, or a small part of one lobe. No tuberculous complications.	(A) (Slight or none). Slight or no constitutional symptoms (including particularly gastric or intestinal disturbance or rapid loss of weight.) Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours. Expectoration usually small in amount, or absent. Tubercle bacilli may be present or absent.
	MODERATELY ADVANCED
STAGE II.—Localized consolidation, moderate in extent with little or no evidence of cavity formation, or infiltration more than under incipient. No serious tuberculous complications.	(B) (Moderate). No marked impairment of function either local or constitutional.
	FAR ADVANCED
STAGE III.—Marked consolidation of an entire lobe, or disseminated areas of beginning cavity formation; or serious tuberculous complications.	(C) (Severe). Marked impairment of function, local and constitutional.

By the use of this scheme, a patient presenting a moderately advanced lesion with incipient symptoms would be classified II A; a patient presenting a moderately advanced lesion with marked impairment of function, local and constitutional, would be classified as II C; one with far advanced lesion, with no marked impairment of function, either local or constitutional, would be classified III B, etc.

This gives one at a glance an accurate idea, not only of the extent of lung involvement, but also of the toxæmic state of the patient.

The chief object which I have in view is to make the present classification more flexible as, at the present time, the physical signs and symptoms are immobilized in it. The suggested revision enables one to use any one of the three classes of symptoms with incipient, moderately advanced and far advanced lesions anatomically. This offers nine combinations and I feel that it covers the various run of cases very much more effectually than the classification now in use without changing the fundamental idea and without substituting a lot of complicated definitions.

On motion, the President appointed Doctors Brown, Washburn and Rathbun a committee to report on the matter at the next meeting, in May, 1916.

President: The first regular subject on the program for to-day is now open for discussion, viz., "How Can Medical Schools Be Induced to Teach More Regarding Tuberculosis?"

Dr. Newcomb: Jefferson has a separate hospital for tuberculosis, consisting of forty beds and a dispensary. In the third year eight lectures

are given on tuberculosis. The class is divided into small sections and each section spends four hours per week for ten weeks taking histories and examining cases in the wards. They attend autopsies on all cases dying in the wards. In the fourth year each section spends two hours per week for five weeks. Each resident is required to serve two months as resident in the tuberculosis hospital. Each nurse in training serves three months in the tuberculosis hospital. I think every medical college should have a chair of tuberculosis.

Dr. E. R. Baldwin: I have had very little opportunity to learn what is going on elsewhere, but I know that there is an increasing interest in tuberculosis on the part of the chairs of medicine in most of the universities. Dr. James when he became professor of medicine in Columbia said that he would devote much of his time to it, and Professor Longcope intends to develop that side of the work, and to have a special schedule relating directly to tuberculosis, singling it out from other diseases and giving it special notice. In Yale, they have Dr. Lyman who is giving much attention to the subject, and in Philadelphia the University has charge of the Phipps Institute, which brings them in touch with the work in the city.

It does seem difficult, however, to induce the average university to get in line with this work, and it will continue to be so until it is made more attractive either by showing them some future in the study of tuberculosis, and opening some broader field or career to the men who are interested. Until that time, tuberculosis as a specialty will be secondary to the other specialties. The university authorities generally feel that they are covering all the subjects in the best proportion that they possibly can during the time at their disposal in the four years, and that it is impossible to give any better instruction in tuberculosis in the ordinary medical school. Very few of those present could say that they received any special instruction in tuberculosis during their college courses, but there is a feeling to-day that it is important, and it is being emphasized.

At present it does not seem that the Sanatorium Association can do anything in this direction except to encourage the universities and teach them to utilize the near-by sanatoria for this work and also to give lectures in the clinics and at various dispensaries and colleges, and show their students what the modern methods are. I have just heard from one of the Boston men associated with the State Sanatorium that it is very hard to get the Harvard men to go to the sanatorium at Rutland.

Dr. Washburn: I have just read a very interesting book called "The Profession of Medicine," being a collection of letters from graduates of the Harvard Medical School, most of them graduates of ten or twelve years' standing, telling why they have or have not succeeded. One man said he had found that his lack of teaching in tuberculosis while he was a student in the medical school had proved a serious detriment. It is true, as Dr. Baldwin has said, that it is very difficult to get medical students to come to the sanatoria. They have a definite invitation to come to the Rutland Sanatorium for a week or a month once a year. A professor in

a homeopathic medical school comes with his class for one day; otherwise they do not come. I understand that the trustees have under consideration offering some one student of the third or fourth year a period of instruction during the summer months. During the summer months the Massachusetts sanatoria could take care of three men at each State sanatorium, making a total of twelve men, each for one month's instruction, every year.

Dr. Knopf: I have not had very much to do with under-graduates, but from my experience at the New York Post Graduate School, relatively few men have a good idea of early diagnosis, and it cannot be too much emphasized that more attention should be given to the teaching of early diagnosis in the under-graduate schools. The Bellevue Medical College has recently instituted a chair for tuberculosis and intends to pay more attention to it in future than it has been possible to do heretofore.

I cannot over-emphasize the value of what Dr. Baldwin has said about inducing the nearby sanatoria to extend their hospitality to senior medical students in order to give them opportunities for interneship. However, I know how difficult it is to get internes for the service at Riverside Hospital. If these internes could be paid a small amount, it might be easier to get them. Tuberculosis, it must be remembered, is a specialty, but we should do our best to induce all the medical colleges to have a course for the teaching of diagnosis and modern treatment of tuberculosis, particularly pulmonary and laryngeal. Many a student graduate has never seen a sanatorium and does not know what sanatorium treatment means. The hospitality of sanatoria and special tuberculosis hospitals should be extended to nearby colleges so that their senior students might not only learn the early diagnosis of tuberculosis, but also learn something about modern phthisiotherapy.

Dr. Bowditch: I can say how difficult it is to get such instruction at the medical schools. At the Harvard Medical School I have offered at times to teach classes what the methods are which are employed at the Sharon Sanatorium, but the only response I have ever had was from Dr. E. A. Locke of Boston, who for two or three years brought different classes of his students to the sanatorium. In every case they expressed themselves as much gratified at the opportunity of seeing the methods employed for the treatment of patients of this class, which had not been brought to their attention before. Since Dr. Locke's change of work, however, no students have visited the sanatorium. Every one knows that the curriculum is very much crowded, and that it is difficult for busy students to come out eighteen miles from Boston; yet it could be done if there were not an indifference on the part of most of the teachers.

Dr. F. Trudeau: My memory of the medical school is as fresh as that of any one present. There are two points that might increase the interest in tuberculosis during medical school. One of these is to instil into the minds of students less fear in regard to infection. Some of the students declare that they would not go anywhere near tuberculosis institutions, as they are afraid of them. If the students can be taught that they would

not necessarily contract tuberculosis, and that extra precautions would be taken in examining the patients in order to prevent infection, it might help a lot. Then, special courses should be instituted. Not only should these be offered, but they should be made compulsory. As a rule, doctors need to know more than they do, as can be seen when they send patients to Saranac. They frequently say that they are just beginning with pulmonary tuberculosis, when in reality they are in the last stage. For that reason doctors should be taught this subject compulsorily.

Dr. D. A. Stewart (by letter): There are two ways of inoculating a medical school. One can, on the one hand, endeavor to inoculate the faculty, hoping that from them the infection may spread to the students. That is, we may pass resolutions, send delegations, and endeavor to have tuberculosis given a proper place in the teaching of the school. If we are very successful, this will lead to didactic lectures delivered by some one interested and experienced in tuberculosis work, and to an arrangement by which a dozen students will crowd around one patient in a tuberculosis clinic, and listen to the scrape of one another's stethoscopes.

Another way to get a new idea into a medical school is to inoculate the students directly. This we think we have done with some little success. Possibly our plan may be interesting to others. We have the advantage of working in a somewhat circumscribed field. In the Province of Manitoba there is *one* sanatorium with a capacity of about 116, including some advanced cases, and *one* hospital for advanced cases of the City of Winnipeg, with a capacity of about 80. There is *one* medical school graduating a class of twenty to twenty-five men a year, and one large teaching general hospital. As superintendent of the sanatorium, I approached the fifth year students three years ago, inviting them to visit the sanatorium at any time of the year for two weeks, and arranged to put them up two at a time. At first, we even paid their fares. This invitation was eagerly accepted and the plan worked well.

We have now a slightly different arrangement. We are now affiliated with the large General Hospital of the Province, which is closely connected with the medical school, and receive from it one of its internes each month, who helps in the sanatorium work. We have thus each year twelve young graduates who spend a month each in sanatorium work. After leaving us they go directly to the hospital for advanced cases for another month, thus spending two months of their first year after graduation, in gaining experience in tuberculosis. We, of course, pay the fare of these men. Besides, we still invite fifth year students during the term, or between terms, to come out, one at a time, but we do not pay their fares, though we put them up and treat them while here as members of the staff. We also let members of the profession throughout the Province know that we can be counted on to have a spare bed for one who cares to come and spend a week with us. Men who come in these ways are treated as members of the staff and drop into the work of the institution. They help with the laboratory work, and, under supervision, write histories, which are discussed and criticized, and frequently rewritten. They examine patients

only with permanent members of the staff, and only when examinations are needed. Usually one interne or student examines with me, and one with my more permanent assistant. The result is that most of the men going out into practise in this Province have spent a little time at the sanatorium, and many men become enthusiastic over the work. Men who do not manage to stay here get some interest in the work second-hand from their fellow students or internes. On their return, the students have a renewed interest in the work of the tuberculosis clinic, and are of considerable assistance in it. This fairly large stream of young men passing through the sanatorium also gives an excellent opportunity for the selection of more permanent assistants.

It will be said, I have no doubt, that two weeks or even a month gives far too short a time for acquiring any real knowledge of tuberculosis, its diagnosis and treatment. That is quite true; yet if a man is keen, and if he is constantly under instruction, he can acquire a great deal in even so short a time. In any case, it is better to have two weeks than to have nothing. It is even something for a young doctor before going into general practise to know what one hundred and twenty or more tuberculous patients look like, to know a little of the methods of early diagnosis, and to have some idea of the infinite variety of problems presented in the course, treatment and prognosis of tuberculous cases.

I cannot say that the help we receive is at all equal to the work this arrangement involves, but we consider it an important part of the work of the sanatorium, to be done as well as we can do it even at a considerable expenditure of time and energy.

The sanatorium is located one hundred and forty miles from the medical school and hospital, so that we cannot be said to be very conveniently placed. I imagine, however, that we succeed even better on account of the distance, because the men have to make a considerable stay and devote their time when here to one thing only. We have had the cooperation of the faculty of the school, and a student is allowed his lectures while here, but we reach the men through their own organization, and the president of the final year usually arranges the order in which they come. Possibly our problem is simpler than usual, because we have in the Province, *one* medical school, *one* sanatorium, *one* hospital for advanced cases, and *one* chief teaching hospital. However, I am convinced that practically any medical school could be inoculated by practically any sanatorium in much the same way.

President: We will now pass on to the second topic for consideration this morning, viz., "How Long Should Artificial Pneumothorax Be Maintained?"

Dr. E. R. Baldwin: I think an experience of five years will be necessary before I shall be willing to commit myself, from a conservative standpoint. We have had very few favorable cases for pneumothorax. From offhand memory, I would say that there are about three patients who have been wholly or partly re-expanded who are fairly safe in the ordinary conditions of living. One patient who came down on the train last night is

pretty actively at work. He had a relapse last March in the good lung, and is now a chronic invalid from the disease in both lungs.

How long pneumothorax should be continued is still an unsettled question, and it is a matter of individual judgment for each patient. If I were to attempt pneumothorax for an incipient case, I should think that a year or a year and a half would be about the limit of time to maintain it. We usually allow a year for the arrest of the disease. To keep it up longer might possibly give pathological results which would be prejudicial to the patient by the cicatricial contraction of healthy lung tissue. We have not yet sufficient pathological data to show what prolonged pneumothorax will do. The experiments of Spengler and others in Europe show that re-expansion is good after a year, a year and a half, or two years.

My own experience dates back about three years and ten months. We began to use it in February, 1912, but that is not long enough to determine the question.

Dr. Lloyd: In our institution we have not had much experience in allowing the lungs to expand voluntarily. Most of the lungs have come up because we thought we would allow an effusion to keep up the compression. In each case, however, the effusion has been absorbed without warning and the lung expanded and stuck. Three out of four cases of this kind have done very well; the other one, however, is dead. There are five cases in which the chest was aspirated on account of flare-up in the better lung, two of these died promptly; of the other three, two are living and one is dead. In the one which died, compression had been continued for a year and a half, and we aspirated in order to allow the lung to re-expand, but it did not expand to any degree. In another case, that of a young Jew, the patient after leaving the sanatorium waited for three weeks beyond the usual interval for a refill, trying to save $5.00, and when the attempt was made the lung was found to be stuck tight. This was nearly six months ago and he continues to improve. The lung was collapsed for a little over two years. We feel that compression should be kept up just as long as possible.

Dr. Rosenberg: How many of you have used it for long periods with effusion, usually a purulent effusion? In my experience a large number of those which are treated long enough get up an effusion with fever and prostration. That is one eventuality which will largely influence the length of time for which compression by air is kept up. The cases of effusion I have observed were let alone. Recently I had opportunity to examine three of these cases. Two of them had a serious effusion, and the other a purulent one. The one with the purulent effusion had step-ladder adhesions in the lung which walled off two or more pus cavities. In all three cases the effusions had been absorbed and the lungs have expanded, so far as could be determined by physical examination. There was no opportunity to have them x-rayed.

An interesting point was that these were three advanced cases, one almost hopeless, and one has returned to his work and is doing well. The point has been well brought out that it requires a greatly varying period

to produce fibrosis in lungs artificially compressed. For instance, the three cases referred to, although subjected to treatment so long ago as the winter of 1912-13, have complete, or what appear to be complete re-expansion of the lung; on the other hand, I recall the case of one of our earliest compressions, who died of an intercurrent affection three months after the initial inflation, and in this case there was a perfect sclerosis.

Dr. Griffin: Artificial pneumothorax is a long drawn out process, and I have hesitated to start it with some new cases because of this fact, since patients frequently cannot stay in the sanatorium long enough to complete the treatment. Then, too, there is always the difficulty that we do not know when it is wise to stop the treatment. And further, the ultimate value of the procedure has not, it seems to me, been fully established, but perhaps I expect too much.

In two recent cases I have not tried to fully compress the lung and to keep it fully compressed for a long time, but to give a small amount for definite symptoms and to let up on treatment when these had abated. Only a few treatments were given, and still these two patients continued to gain even though all the gas was soon absorbed, as shown by x-ray.

It might be interesting to hear of a case treated in private practise. This case, which seemed by the physical signs to be in stage one, or possibly stage one B, received perfect compression. This was kept up for eight months, after which the compression was allowed to decrease. This occupied seven or eight months. At this time the temperature again appeared and compression was again started, followed by amelioration of the symptoms. Unfortunately, the second time adhesions formed faster than they could be relieved, and finally very little compression could be put on the lung. Recently I have been studying this case with Dr. Floyd. We find that at no time can we get in more than two or three hundred c.c. At first we put in this amount every week, and more recently every two weeks. At times the needle seemed to communicate with a bronchus. This was determined by the employment of a small device which Dr. Floyd made, that holds a drop of oil of peppermint. This is inserted in the discharge tube. Whenever the needle is in a bronchus the patient immediately detects the odor of peppermint in her own breath. Usually one or two small sacs can be found in this case where small amounts of nitrogen can be injected, although at times considerable pressure has to be employed. Yesterday, for example, we found a sac which at first showed a negative pressure. This very quickly changed to a positive reading when a small amount of gas had been introduced. As much pressure was given as possible by raising the pressure bottle and then Dr. Floyd forced more nitrogen into the patient by blowing into the vent tube of this bottle. In this way about two hundred c.c. were introduced. Of course, brilliant results have not been attained in this case, but the patient has seemed to grow gradually better or at least not to go down hill so fast.

Dr. Mills: In our experience at Loomis Sanatorium we have found that sooner or later, in almost all cases, this question decides itself and the treatment for some reason or other has to be stopped. I have gone over

our sixty-one cases, which up to date have been treated by this method, to see for what reason the treatment was stopped in each. These were all far advanced and progressive cases, and all under sanatorium care.

There are at present seven cases under treatment, leaving fifty-four which have been discharged from treatment. Out of these fifty-four cases there were sixteen in which either no collapse could be obtained or it was so slight as to be unsatisfactory and was abandoned after a few attempts, leaving thirty-eight cases in which satisfactory collapse was obtained. In seven cases the patients left the sanatorium while under treatment, it being continued elsewhere in some. In one case where it was given to stop hemorrhages the patient died in two or three days from post-hemorrhagic pneumonia. Five other cases developed an effusion of such amount as to prevent further gas injections and in these cases we have not attempted to withdraw the fluid and re-inject gas on account of the danger of reinfection if this course is persisted in. The cases in which there has been effusion have been among the best cases as to results. Then there were three instances in which, after a long period of treatment, for some reason less and less gas could be injected at each refill, until finally perhaps not more than two hundred cubic centimeters could be injected. When investigated by x-ray, the condition seemed to be due to a gradual building up of adhesions from the base, the adhesions becoming a little more extensive between successive collapses, till finally most of the pneumothorax space had been filled up.

Then there were about thirteen cases in which there was no improvement, the disease continuing to progress after treatment. In these cases the treatment was kept up for two or three months, and if the disease was still progressing the treatment was stopped.

This left nine cases in which it was necessary to decide whether or not to stop treatment. These cases all showed temporary improvement, but sooner or later the improvement ceased and the patient began to lose ground. They were treated then just as were the others in whom the disease was progressive from the start. If after two or three months the disease was found to be progressing or spreading in the other lung, the treatment was stopped.

Of the seven cases still under treatment, the longest has been under treatment for fifteen months. My personal feeling is that the treatment ought to be continued as long as possible. I would be very much afraid (even when the disease is apparently arrested) to let the lung expand again.

The principal point I wish to make is that in this treatment the question of when to stop is sooner or later in most cases decided for one. Perhaps this report may sound pessimistic, but in reality I feel optimistic in regard to this treatment, considering the class of cases upon which it has been used.

Looking over these cases with regard to results to be obtained I find that twenty-five out of the thirty-eight in which collapse has been induced showed improvement,— though sometimes only temporary. There is no doubt that in these far advanced progressive cases treated by pneumothorax a large majority will show a temporary abatement and relief of

symptoms, and in a small number of cases there will be arrest of the condition and the patient will be saved from what to all appearances was a certain doom; so that I feel that even if the treatment has to be stopped sooner or later, it is very valuable. One can expect a certain number of very striking recoveries under it. It is, of course, applicable to only a small number of cases, and more and more the fact is impressed upon us that a careful selection of cases suitable for treatment is as important a point as any in securing good results from artificial pneumothorax.

Dr. Lloyd: How many cases had been reported as going through childbirth? A case who was collapsed at Trudeau in October, 1912, entered our training school; she got along finely, and had a flare-up up to the time she got married in the fall of 1914, and in August of this year she had an entirely uneventful labor and has gotten along well since.

Dr. Allison: I recently saw a case on which artificial pneumothorax was instituted by Dr. Sachs at Naperville about eighteen months ago. She was, I believe, a far advanced unilateral case, with markedly active symptoms. She has since then been delivered of a healthy child with no apparent bad effects. She has no symptoms which would indicate activity of her disease and she has gained about thirty-five pounds in weight. She is still taking artificial pneumothorax.

Dr. Baldwin: I will tell a story I heard about Professor Forlanini. A visitor went through his clinic a year or two ago and asked if he could show him a cure lasting some years. He replied, "Certainly," and advised him to go to a candy shop near by and buy some candy of the young woman there. The visitor did so, and saw a buxom woman, apparently in perfect health. He returned to the professor and asked how long since he had ceased treatment, and he responded that they had not ceased treatment. The visitor then inquired how long it had continued. "Ten years," was the reply. "We would not spoil the symmetry of a chest like that," he remarked in explanation.

Dr. Knopf: I would like to know something more about early cases suitable for treatment. Dr. Baldwin has said that he did not know just how long to continue treating them. Is there any one present who uses pneumothorax in early cases?

Dr. Baldwin: I have not had any myself, but I would not use it in hemorrhage cases.

Dr. Brown: One case which Dr. Mills reported came under my care later, and was very interesting, for the patient had only a partial collapse and wanted a positive pressure on the lung. Only twenty to twenty-five cm. pressure of water was used. Some time later when she had a coughing spell, the lung became ruptured and she developed pyopneumothorax. The case was studied by Dr. Krause and he found fresh miliary tubercles in the collapsed lung, which had been collapsed for several months. That shows what may take place in a collapsed lung. We hope, first, to prevent absorption and overcome the disease; and, second, look for the formation of fibrous tissue. In this case there was much formation of fibrous tissue, although the lung had been extensively involved before the

collapse took place. Such a condition would account for some of the cases in which pneumothorax treatment does not result favorably. The disease may continue to advance in the collapsed lung.

I am not certain that in a case without effusion, where it is watched carefully with the x-ray from time to time, that it may not be safe to allow the lung to expand and see whether or not the symptoms return. I have had one or two cases in which there was no difficulty in recollapsing the lung which had about fully expanded. Of course, in some instances one runs more or less risk when the effusion is slight, for when the patient lies down the effusion may run up about the lung. I would like to ask Dr. Mills whether he thinks that this might have taken place where he found adhesions forming gradually and was able to put in less and less gas.

Dr. Mills: In one case there was a slight effusion.

Dr. Griffin: I merely meant that I should wish to try all other things first. A case has now been in the sanatorium some two months or more. I feel certain that nitrogen would bring down the temperature and lessen to a great extent the cough and expectoration. I know that without it the chances are that the patient will grow progressively worse. And still, knowing the long time and the difficulties involved in artificial pneumothorax, I have hesitated to begin treatment in this case until everything else has been tried.

The afternoon session was called to order at 2:20 P. M., Dr. Vincent Y. Bowditch, President, in the chair.

President: We will now proceed to the discussion of the next subject on the program, "The Necessity for Thorough and Repeated Examinations and Prolonged Observation of Patients with Suspicious Symptoms Before a Definite Diagnosis Is Made."

Dr. Rosenberg: It is a rather obvious matter and I do not know how it should be discussed. Every one agrees as to the necessity of thorough and repeated examinations. That holds true in regard to any disease, whether tuberculous or not. The practical importance of this question to those who have to deal with it is very great. The tendency, however, on the part of the profession, even those who are expert, has been to over-alarm the patient on slender evidence. While it is highly important that the patient should be acquainted with the possibilities of the situation and should guide himself accordingly, it is a very serious matter to tell a man or woman, especially those who are bread winners, that they must change their mode of living or emigrate to what is supposed to be a more salubrious climate. Very few men outside of the sanatoria appreciate the consequences of this. The men from the far West can tell how many people of little or no means have broken up the family and emigrated West or Southwest in the hope of avoiding the possibilities of infection from tuberculosis. Most of these health resorts are at present over-crowded with indigent persons, and the authorities there can never cope with the poverty of the health seekers, many of whom are liable to starvation and their families with them.

This question also brings up again the importance of the point discussed

in the morning: the responsibility of the medical schools in teaching the subject of tuberculosis. If the students left the colleges better prepared to make a diagnosis, the matter would be much cleared up. This is beginning to be appreciated, and while it seems difficult for the various colleges to add to their curricula, it may be possible for the teachers of physical diagnosis to pay more attention to this subject.

Of late much stress has been placed upon the importance of the x-ray findings in tuberculosis. It is an extremely valuable aid, but there is a possibility of placing too much reliance upon it. Dr. Heise will doubtless corroborate this statement. The x-ray plate simply shows a dense place in the lung. The requirement of a "prolonged observation" of patients is not very definite. All those present have seen patients who have been observed for a very long period and yet it was impossible to say finally whether or not they had tuberculosis.

Dr. McSweeny: I have no constitutional objection to standardization, though rather prejudiced in that regard, but I am convinced that standardization as regards tuberculosis cases is an attempt to accomplish the impossible. Nothing calls more definitely and urgently for the application of individual good judgment and mature consideration. The lack of experience with, or lack of knowledge of pre-existing conditions in any individual who does not show the common symptoms which would at once place the patient in the tuberculous class, might well lead to the wrong diagnosis.

Dr. Brown has brought up the point more than once, and very wisely, that there has been a tendency to err in considering cases mainly from the anatomical standpoint. As a reaction from that we have as an example the resolution adopted by the New York City Department of Health in regard to admitting patients to institutions under its control, requiring the demonstration of bacilli in the sputum of all patients who seek to enter hospitals. Such an extreme is equally objectionable as the former.

In preparing a paper on this subject last year, I referred to an article by Hamman and Baetjer who examined fifty individuals selected for their healthy history and appearance, and who were supposed to be well, in thirty-nine of whom they demonstrated by physical examination, confirmed by x-ray, that there were definite changes in the lungs. These changes may or may not have been tuberculous. Now, when a patient presents himself for examination he usually comes, to be sure, because of symptoms due to a certain amount of toxæmia, and this justifies a presumption that if we find changes in his lungs, they are probably tuberculous, even barring the third element necessary to a diagnosis, tubercle bacilli. However, there are many points to be taken into consideration in the arrival at a proper diagnosis. It is a tragedy in the life of the average individual to be pronounced tuberculous, especially when they have just started on their career, as they have in most cases which come under medical observation. Let us not, then, forget these thirty-nine out of fifty cases which I have alluded to.

I think it is fair to say then that of the three factors in the diagnosis,

the bacillus and the symptoms of toxæmia are the most important and in inverse order from the practical standpoint. It is certainly rare to find toxæmia without being able to demonstrate anatomical changes, and I am at a loss to understand how it is that even the x-ray apparently misses them in not a few cases. I saw a case recently in a boy of eighteen years of age, in apparently robust health, but with definite toxæmic tuberculous signs which most painstaking care failed to trace to anything else, yet two competent x-ray men had made pictures of his chest with findings which amounted practically to nothing.

We all know that the demonstration of tubercle bacilli may be by no means an easy matter, and it may require having a patient under your control over a considerable period of time where you yourself can supervise the obtaining of specimens and not leave it to him or her, no matter how careful the instructions. There is a type of patient, too, who frequents both private and public hospitals, whose honesty in this regard cannot be trusted. It is only by prolonged observation, careful watching and study that one can come to a rightful conclusion in many cases as to whether the patient is suffering from a chest condition of any sort or something else, and whether this pulmonary disease is tuberculous, syphilitic, etc., etc. If, in the course of your investigations, you find the bacillus, so much the better, but even in those cases in which it is found, it is not uncommon to come to the conclusion that the patient has a chronic fibroid phthisis, but that he is suffering from some other coexisting disease. The question of thorough and repeated examinations of patients with suspicious symptoms is of vital importance in so many cases. There is so much at stake and in many it practically means everything to the individual whether or not he enters upon the life of a tuberculous invalid. There are cases, I admit, to whom it is a matter of no apparent consequence as to whether a correct diagnosis is made or not. They are getting along very nicely in the hospital and seem to enjoy it, but on economic grounds this can hardly be justified.

We must not forget, too, that there is a residue of cases in which diagnosis cannot be made, and that the actual number of these is very considerable in the practise of any one who sees a lot of tuberculosis. They come constantly to Sea View and therefore I have urged the necessity of establishing a diagnostic service as a part of the anti-tuberculosis work in New York City, but the authorities have not seen fit to do so.

Dr. Knopf: If the physician takes the time to go over the chest thoroughly and is willing to see the patient once or twice more, he can generally exclude a certain number of non-tuberculous cases, but all men make mistakes sometimes. I have made them in the past and unless I die soon I expect to make some more, and perhaps many more.

In my service at the Riverside Hospital we always have a number of patients whose cases have been diagnosed in the city clinics as likely to be incipient, but we do not at once send them to Otisville, the municipal sanatorium, but keep them under observation for a few weeks until diagnosis can be firmly established. We should have observation wards

attached to our sanatoria and hospitals in large cities where patients with suspicious symptoms may be admitted for careful observation. Most physicians will agree that more attention should be paid to symptoms than to physical signs. There may be physical signs in many a healthy man or woman, but there are no symptoms in a well individual. The solution of the problem lies in observation and careful study. It is of great importance to many individuals to be told whether or not they have tuberculosis. Many cases cannot be decided by one or two examinations. They must be kept under observation. If a case clears up in a week or two, so much the better; if after a week or two he is found to have tuberculosis, positive and decisive measures can be taken suitable to the condition of the patient.

Dr. Howk: Most of the sanatoria have an observation period for patients during which the diagnosis is made. In large institutions like Dr. McSweeny's there may be need for a special diagnostic department, but in most of the sanatoria the observation is carried on carefully, and the patients are not treated unjustly by being brought there for the determination of the condition, and perhaps being sent out with a clean bill of health.

I have recently seen some striking examples of the ability of laymen to detect symptoms of tuberculosis in people with whom they were closely associated in work, which may be of interest. About a year and a half ago it was decided to bring the superintendents of the Metropolitan to the sanatorium. It was desired that they should become familiar with the institution, and so pave the way for sending patients. Some six hundred superintendents were there during a period of five or six months. They looked the sanatorium over, and I gave them half hour talks on what a layman could do to determine the presence or absence of tuberculosis, calling attention to the prominent and obvious symptoms. This plan yielded most gratifying results. After the return of the different delegations there was an influx of patients from various sections from which the superintendents had come. Several incipient cases of tuberculosis came to the sanatorium from one territory soon after this visit. In nearly all cases the initial tentative diagnosis was made by the superintendents. In three cases the report sent in by the examiner stated that the lesion was on the opposite side from where it existed, so that in three cases out of four it was the observation of the symptoms by laymen that really got the patient under treatment. In the last three months we have had seventy per cent. of incipient cases come to the sanatorium, many of them recommended by the superintendents as the results of their investigation of the men working under them.

Dr. A. J. Stone (guest): I have nothing to add to what Dr. Coolidge has suggested. The matter has come up to the men in the various sanatoria. The question of the patient; it is a very fortunate man who can come to the sanatorium and have the matter settled for him. The men who are returning and being hurried back to work, they all require quite an amount of attention, and are often very troublesome. Certain men can

only see a patient once, and they railroad a certain number along; whereas if the patient could be sent to the sanatorium for observation, or to a clinic under the charge of nurses and physicians, they would not have the stigma of a tuberculosis diagnosis fixed upon them. Several times I have been able to restrain a young man from doing the ordinary things that a boy does outside of his studies, in cases which were suspicious. The amount of work that he does under observation will not hurt him and we have been able to hold them in the sanatorium for their benefit and not to their detriment.

Dr. Brannan (guest): I have seen some suspicious cases with Dr. Knopf, and have listened to the discussion with much pleasure and profit. I wish very much that men who are not in the sanatorium work could hear just what Dr. Coolidge has said about diagnosis made in despatch after one or two examinations, either after or before patients have gone to the sanatorium. How can these men be reached who make such diagnoses? They do not know the importance of what they are doing. I would like to see the proceedings of the Association put in the hands of many men here in New York. There is a tuberculosis clinic in all of the hospitals in the city, and hundreds and even thousands of cases are handled there, besides those that come directly into the hospitals. It is probable that very few men engaged in this work feel themselves quite competent to make a diagnosis upon one examination.

I judge this from the returns I hear from the Metropolitan Hospital, and the one on North Brother Island that numbers of cases have been found negative,—quite a large proportion, and despite diagnoses made by men who claim to be specialists in the Department of Health.

If I might venture to suggest a subject for discussion at a future meeting, I would like to see the Association take up a problem which is a real one; one which, if I might use such a term, we have on our backs on the East River. Our day-camp boat *Westfield,* has a class of patients from among the Jewish population who are especially liable to enjoy this long period of ease and care under the nurses, and they do enjoy it very much. In Bellevue there are fifty or seventy-five men lying in the sun, wrapped up in blankets, fed three times a day, and comfortably housed, and they do not care to go out; and when they do go out they have acquired such habits of doing nothing and being cared for, that it is very difficult to get them back to work as self-supporting citizens. This matter has been brought to my attention by the superintendent when discussing the advisability of building quite a large structure on the pier for the care of such patients. I had not liked the idea of building such an expensive tuberculosis attachment, and I found that the superintendent agreed with me, but for a reason that I had not thought of. He said that the patients in the General Hospital stroll down to the water and become quite dissatisfied with seeing the men on the boat doing nothing, when they themselves come in for only a few weeks and have to go out, although they are not really able to work. I have seen the same thing in some of the private institutions. Up at Bedford there is a large Jewish sanatorium, and the

men there who are of the same class as those in the City institutions were doing absolutely nothing; the women too, though they are generally not so bad. These men would not lift their fingers to do anything for the institution, just as in the City institutions. Ask the men to clean up something, and they decline and say they came in to be treated for tuberculosis, and they understand that one of the necessary factors for treatment of tuberculosis is rest, and while they are in the institution they do not propose to work. I am very much in earnest in asking the Association to do something for this phase of the problem, though probably it has already been considered.

Dr. Coon: Dr. Coolidge's remarks regarding examinations made by physicians after patients have left institutions, interest me very much. Many times when patients have been sent to their homes after several months of treatment and with apparent arrest of the disease they have returned with a statement from the physician at the dispensary or their family physician to the effect that they find the patient is not cured, that the disease is not arrested as yet, that the patient shows physical signs of activity and should go back to the sanatorium at once. There is a phase of this matter which should be impressed upon the medical profession, i. e., the existence of certain physical signs without clinical symptoms does not necessarily indicate a necessity for returning to the sanatorium.

Dr. McSweeny: Dr. Waters asks me to amplify what I said regarding the New York City Department of Health. Their case as I understand it is that, being confronted with insufficient accommodation for the tremendous number of tuberculosis cases, they felt that the first duty of the Department was to care for the presumably infectious, and they therefore adopted the regulation which I mentioned, not with regard to the treatment of tuberculosis, but simply from a public health standpoint. I gladly make this explanation in justice to Dr. Waters. In justice to myself I would say that I was acquainted with this phase of the matter and regard their position as fundamentally unsound.

Dr. Waters: As the Association is discussing the subject of diagnosis, I feel that Dr. McSweeny may have left in the minds of the members the impression that the Department of Health is prepared to insist upon the presence of bacilli in the sputum, as necessary for the diagnosis of pulmonary tuberculosis.

This is not the fact, but there is constantly such a shortage of tuberculosis beds, it is thought wise to provide first for those who are obviously in the infectious stage of the disease. Even though a patient who has negative sputum one day may produce bacilli the next, an attempt to deal first with those who are known to be infectious is necessary, to prevent, as far as possible, the spread of the disease. Even for this class of patients, there are not enough beds.

The function of the Department is preventive; and in this spirit, as an administrative rather than a clinical measure, this procedure has been adopted.

Dr. Rosenberg: I imagine no one will dispute the fact that I am more

or less qualified to discuss tuberculosis among the Jews, and I know something of the psychology of the Jews from Eastern Europe. The facts referred to by Dr. Brannan are partially correct. There is a large number of these people who have been made work-shy, though it is not as Dr. Brannan seems to think, a racial trait. In fact, a large proportion of the Jews of New York City would not have tuberculosis if they had not been overworked and sweated by the rich. The trouble is not with the Jewish patients, per se, but with the physicians who send them in. I know of many who have been kept on the boats for long periods, afterwards entering the sanatorium, where, after observation they had become demoralized by their experience — had in fact developed hypochondrias, and it was always difficult to make them understand that they needed no rest-cure. You cannot blame these people; you cannot stigmatize them as being lazy. The peculiarity of these Jews from Galicia, Roumania, Russia,— not from Germany, France or England — is that they have an inordinate fear of physical pain or ill-health. They may have some suspicious signs of tuberculosis and they drift into the Department of Health, and some one makes a diagnosis of tuberculosis and sends them to some one on the boats where they meet others, more or less ill, so that they soon become morbid with the idea that they are invalids. The great defect in the otherwise excellent management of the Board of Health is the need for more accurate diagnosis. Large numbers of these people have been ill-advised and terrorized, and that is why they are prepared to sit on their haunches and do nothing. They are told that they are the victims of overwork and bad air, and they are glad to make use of the opposite conditions.

Dr. Brown: I have been very desirous of having Dr. Stone tell us what he thinks of this subject from the point of view of a private physician. There are quite a number of patients of whom it is impossible to say whether or not they have tuberculosis. Sometimes men send patients to specialists who are only suspicious cases, and sometimes they are taking a chance on the confirmation of a diagnosis of tuberculosis. I feel sure that when you cannot make a definite diagnosis, you should send the patient to some place where he can get by a careful continuous observation a definite diagnosis made if possible. Send him away and let him remain for a sufficient time to be tested in every way before you decide that he has tuberculosis. The duty that falls on us is to limit the disease, if he has it, to the very earliest stage; to keep him from developing tubercle bacilli in the sputum on account of the danger to the community in general. The important point is that the patient should have either sanatorium or hospital observation before it is decided that he has or has not tuberculosis. I would like to ask Dr. Stone if he thinks in a private case it is important to have the patient go to a hospital and be under careful watch for a week or two.

Dr. Stone: Yes, if it is possible and if they cannot do it at their own homes.

President: The next subject is, "What effect shall the absence of

tubercle bacilli in any of the secretions have upon the notification of a case of tuberculosis."

Dr. Rogers: We have had this question up in Vermont. We have admitted to the sanatorium many cases of young women with a history of tuberculosis in the family, loss of weight, occasional temperature, rapid pulse and a slight enlargement of one or both lobes of the thyroid gland. (This enlargement of the thyroid gland, however, is a very frequent occurrence in our State.)

The cases mentioned usually have slight physical signs in one apex, or there are areas in which the breath sounds are wavy, synchronous with the heart impulse. As a rule, rest will bring the temperature to normal, but the pulse is always from ten to twenty beats higher than normal. They rarely expectorate and we cannot demonstrate tubercle bacilli. Some of these cases, even after long periods of rest, do not run an absolutely normal temperature, the slightest exertion causing them to run an afternoon and evening temperature of one-half to one degree above normal.

I doubt very much the advisability of reporting these cases to the State, as it places a stigma upon them and may in the course of time prevent them or their relatives from obtaining life insurance.

I would like to know if any of the other men have encountered any cases of this type.

Dr. Mills: In the report of the presence or absence of tubercle bacilli in the secretions, especial emphasis should be laid on the method and the thoroughness of the examinations. Of course, we have all had it thoroughly impressed upon us that single or even negative examinations do not necessarily rule out the presence of tubercle bacilli. On the other hand, I am coming to feel that when bacilli are repeatedly absent by one of the concentration methods of examination (Ellermann and Erlandsen, or antiformin), it is strong evidence that there are no bacilli ever present, and the presumption is against the case being tuberculous. We have found, if we except cases which have at some previous time had a positive sputum, that most of the cases where the sputum is repeatedly negative by the Ellermann and Erlandsen method, turn out ultimately to be non-tuberculous. This applies of course only to patients with active symptoms, and not to those with healed or closed lesions, who of course show no bacilli.

I believe therefore that in considering whether a case should be reported as tuberculous, great stress should be laid on the method and the thoroughness with which laboratory examinations have been made. If on several examinations by concentration methods a negative result is always obtained, I believe that we would rarely be justified in reporting the case as tuberculous.

Dr. Knopf: I would like to know if any one would be willing to state how many examinations should be made before definitely excluding bacilli. I know of instances where only the fifteenth or sixteenth examination showed bacillus.

Dr. Denno: I am inclined to agree with Dr. King, so far as notification is concerned, but so far as diagnosis is concerned, it is a different matter. I consider that the State and municipal authorities are chiefly concerned in the prevention of the disease, and since the general belief is that segregation of the cases that have bacilli in the sputum is all that is required to prevent the spread of tuberculosis, one would be fulfilling all necessary requirements of notification by acquainting the Health Department of all cases, as soon as the bacilli are discovered. If one could feel sure that all cases in which bacilli have been or could be discovered would be reported, it would be a distinct advance.

Dr. Bridge: I believe that before deciding whether a suspected patient with the absence of tubercle bacilli in any of the secretions should not be reported to the health authorities, we should take into consideration, besides his physical signs, his history and environment. If he has a history that points strongly toward tuberculosis or long continued exposure to this disease, I believe, we should be extremely loath to dismiss him as non-tuberculous even in the face of negative laboratory findings.

We should attempt to learn whether he has been subjected to and close contact with the above mentioned disease, and we should question him about his environment during working hours, asking whether the atmosphere is filled with dust of any description whatsoever. Often such inquiry brings out facts that help decide whether or not the suspected case is tuberculous even in the absence of tubercle bacilli in any of the secretions.

Dr. English: I wonder what would happen to the men in charge of State institutions if these cases were not reported to the State Board of Health. The New Jersey law declares that the sanatorium can only take care of cases of a curable nature. Twenty-five per cent. of the sanatorium cases have no germs in the sputum, but according to the State Board of Health they must be reported. I do not know what would happen if we declared that the consensus of opinion as to diagnosis was vague, but fear that the State Board of Health would say that such cases must either be kept out of the sanatorium or must be reported, as they must be certified as having tuberculosis prior to admittance. It makes no difference if they are discharged; they are already labeled as having had it. Last year a man was admitted who apparently did not have tuberculosis and was so discharged, but he had been certified as having had the disease, and since that time he has been twice rejected by insurance companies. Unless the law is changed, the persons in charge of State institutions will have to report all cases, whether they are positive or negative.

Dr. Rathbun: We have ninety children fourteen years of age and under at the Otisville Sanatorium, and only five per cent. of these have positive sputum. A small percentage have physical signs which seems to indicate tuberculosis. Practically all of them have been exposed to tuberculosis in their homes and all are Von Pirquet reactors. Of course, all of these children go on the records as cases of tuberculosis, when they

are admitted to an institution, although it cannot be said that they are all active cases. The usual symptoms are loss of weight, slight temperature and very seldom cough and expectoration. These cases make remarkable progress under treatment, gain considerable weight and go back to the city in splendid condition. It would seem justifiable to treat such children in tuberculosis institutions, even though only the bronchial glands are involved.

Dr. English: In our institution we have forty-five children and few of them have tubercle bacilli. Most of these children are under twelve years of age. It has been my experience that when a child ten or twelve years of age has tubercle bacilli in the sputum, it will never get well. Ours are cases that have had symptoms of active tuberculosis before they were admitted, but nothing on physical examination was found in the lungs to account for the symptoms. An x-ray picture will show enlarged glands. Under present conditions, such cases have to be reported.

Dr. Washburn: At the Rutland Sanatorium we have a patient who has undoubtedly pulmonary tuberculosis, moderately advanced, but whose sputum has been persistently negative. The city of her legal settlement, which under the Massachusetts law must pay her bills, refuses to pay them on the ground that in view of the persistently negative sputum she is not tuberculous. I have given the case to the Attorney-General for collection and am wondering whether the burden of proof is on me to show that she has tuberculosis, or on the city to show that she has not.

Dr. Griffin: There are patients who have definite signs in the chest without tubercle bacilli, but with some other causal agent, such as the grippe bacillus or pneumococci. I have seen several such cases. The tendency has been to call them tubercular and to report them as such. Unfortunately for our peace of mind, several years ago Dr. Lord of Boston claimed that we were making our reports better than they should be by classifying these cases as tubercular, since the prognosis is naturally better than in cases of tuberculosis. It is also manifestly unfair to the patient to brand him with tuberculosis.

Dr. Allison: Speaking with regard to conditions we have to deal with in the children of Chicago, since I have been there we have had from one hundred and fifty to two hundred children pass through our hands, and to the best of my knowledge there have not been more than six positive sputum cases.

They generally come in with a diagnosis of glandular tuberculosis, most of them have enlargement of the cervical glands with a positive Von Pirquet. Many of these show enlarged and congested tonsils and will give a history of repeated attacks of tonsilitis, which may account for the glands.

It is required that the Health Department be notified of these cases within twenty-four hours after their admission. That is, these children are classified as tuberculous and are followed up by the Health Department and classed by them as tuberculous until they die, when at least ninety-five per cent. of them are certainly not clinically tuberculous.

Dr. English: Why does not the institution discharge them as non-tuberculous within twenty-four hours after admission?

Dr. Segal: I am not interested in this question from the same view point as you gentlemen, as we in our country (Canada) are under no obligation to officially notify our tuberculous cases. I am, however, keenly interested in this subject from the purely medical point of view. Some cases of moderate bronchiectasis seem to resemble tuberculosis in all particulars excepting the presence of tubercle bacilli in the sputum, and it sometimes becomes very important to decide one way or the other.

As an example I wish to mention the case of an ex-patient of ours who became a subject of debate between our sanatorium and some institutions in Montreal. We discharged him as non-tubercular and recommended him to a general hospital for the treatment of a considerable nephritis from which he was also suffering. He was tossed about from one hospital to another and was finally recommended to us again as he was believed to suffer from pulmonary tuberculosis. Eventually he died and the post mortem proved that the lung lesion was bronchiectatic and non-tubercular.

I have at present under my care a case which I feel is one of bronchiectasis, but which the x-ray man cannot positively confirm as such. I am making these remarks with the hope that some of you gentlemen with wider experience on the subject, will be able to tell me of a method, more positive than clinical observation alone, which will help to decide on the cause of a pulmonary lesion, which, excepting the presence of tubercle bacilli in the sputum, resembles tuberculosis very suspiciously.

Dr. Brown: May I ask if the physician of the State Board of Health, Dr. Denno, thinks that it is not necessary to report any case of tuberculosis without the evidence of tubercle bacilli in the sputum?

Dr. Denno: I do not wish to be misunderstood. For the purpose of prevention, the Department should receive notification of all cases in whom tubercle bacilli have been found. I understand the question to be: Should one report a person as being tuberculous before finding the bacillus? If you have not found it, and are not settled in your own mind, why should you report it as such? The law requires that you report a case of tuberculosis within twenty-four hours. If you are satisfied that it is a case of tuberculosis, even if you are unable to find the bacilli, it should be reported; but if you are in doubt, why should you report it?

Dr. Cole: May I say a word on this subject before it is closed, in regard to the classification of cases without the recognition of the bacillus in the sputum? Recently at Saranac I have seen the work of Dr. Heise, and it is well worth a trip to Saranac to see it. It is only fair to state that he can and does see and show practically any lesion or any group of miliary or conglomerate tubercles that could be detected by any means (even examination of the lungs after death), by the method which he employs.

To speak of something more definite, I would ask you why you have

to have tubercle bacilli? We can see any number of cases where the lesion is perfectly definite and yet there are no bacilli in the sputum.

The classification which I present is a suggestion of Dr. Steiner from the Agnes Memorial Sanatorium in Denver, who came on last fall largely to attempt to get a classification of tuberculosis which would be acceptable to pathologists, roentgenologists and to the clinicians. In an article which I published in 1910, I had such a classification, based upon pathology, but using the term of infiltration for the things seen on the plate. That classification was made under two headings; one of the type of lesion and the other of the region involved; yet it was so complicated that it was not acceptable to the general practitioners, and it was not scientific from a pathological standpoint. Dr. Steiner spent nearly three

PATHOLOGICAL	ANATOMICAL Hylus. 1. Tracheo-bronchial lymph-nodes. 2. Bronchial Walls. 3. Connective tissue septs.	Bronchus. 4. Lymph-nodes. 5. Walls of Bronchi. 6. Perivascular tissues.	Parenchyma. 7. Terminal alveoli. 8. Bronchioles.	Pleura. 9. Visceral. 10. Parietal. 11. Inter-lobar. 12. Intra-pleural.
A. Cellular. HYLUARY B. Fibrous. C. Calcific.				
D. Broncho. PNEUMONIC E. Diffuse (Caseation). F. Cavity (Bronchiectatic).				
FIBROID G. Connective Tissue (Chronic) hyperplasia. H. Calcification. I. Emphysema.				

Key:
Acute.
Chronic.

weeks with me going over this subject, and together we did the best we could. Then we presented our classification to Dr. Ewing who modified it very materially as a pathologist.

I submit this classification not as a finished product, but simply as a work based primarily on the pathology which can show all these conditions and can fit the Roentgen findings to the clinical aspects of the case.

President: We will now pass on to the last topic of the day, "Is the Sanatorium teaching patients as thoroughly as possible the proper means of preventing the spread of infection with especial reference to cough and expectoration?"

Dr. Lloyd: This is a question which all should be interested in, and I am very much interested in knowing if the same things are said in other sanatoria that I have heard in mine. I have had nurses and doctors go to other sanatoria from mine and they have written back that there was so much carelessness that they were afraid to remain where they were. I would like very much to know what the Association thinks of this, and if what I have heard is a real index of whether or not the proper means of prevention are being taught. If the patients in the Sanatorium are not being properly taught, what can we expect of patients who do not receive sanatorium treatment?

Dr. Knopf: I would like to have that question divided; sanatoria for the well-to-do, and sanatoria for the poor. There is a vast difference between dealing with an intellectual class and dealing with an ignorant class. In my own service it had been found necessary to install a sort of prison for the punishment of refractory patients. The very thought that if a patient does not do what he ought, either by careless expectoration or other refraction of the rules, he will be put in prison right near the hospital where other patients can see him in his plight, will be a deterrent.

Do we teach sufficient precautions? I think there is only one lack; we do not repeat the instructions often enough; we do not with sufficient frequency insist upon the necessity of holding a handkerchief or piece of cloth to the mouth when coughing. Very seldom now will a patient in a sanatorium expectorate where he should not. But when it comes to avoid droplet infection from mere coughing, we should lay more emphasis upon the necessity of carefulness. When the hospitals are very crowded and consequently the beds have to be placed closer together than the three or four feet which should separate them, I have the head-end and the foot-end of the beds alternate so that the patient coughing unconsciously during the night will eject the small particles of bacilliferous saliva in the direction of the covered feet of his neighbor instead of the latter's uncovered head.

Dr. Lloyd: Since Dr. Knopf has told his method of checking refractory patients, I will tell of an incident which came to our attention recently. We received a report from two of our patients who had been discharged in good condition and whom we regarded as being above the

average in intelligence. Complaint was made to the City Board of Health as to their careless methods of coughing and expectorating, and they were put out of the boarding house by the landlord.

Dr. Rosenberg: It is largely a question of erring humanity. Every one knows how quickly we forget on Monday the admonitions heard on Sunday. I have had patients cooperate with the regulations very quickly while under treatment, and yet as soon as they pass from the influence of the sanatorium and the morale of the place, they forget what they have learned there.

Dr. Knopf: I have had a similar experience myself, and I now tell my patients to buy cheap muslin cut up in squares to simulate handkerchiefs and use these instead of the cup; thus they avoid attracting attention to their infirmity.

Dr. Ford: We can teach patients to use care even to the extent of employing sputum cups in crowded cars. It is my practice to explain to new patients what tuberculosis is and how the infection is spread, with special attention to the care of sputum and the danger of coughing and sneezing without shielding the mouth and nose. Every few weeks the patients have a lecture on some phase of tuberculosis and always before starting on the subject in hand, the danger of careless expectoration and of coughing and sneezing without shielding the mouth and nose is always emphasized. I appeal especially to them by telling of the danger of infecting the young and where married people are concerned and those patients who have younger brothers and sisters at home, this seems to carry a great deal of weight. The fact that they are apt to infect some of their own family rather than some outsider drives home the necessity of being careful very strongly.

There is, of course, a class of patients who will be careless no matter what we do. One such case recently came to my notice. A patient who had been with us about six months and about to be discharged was on his way back to the shack from his final examination. Just as he reached the foot of the steps of the shack he deliberately spat upon the ground and this in spite of all the teachings he had heard during his stay in the institution. One of the other patients seeing him, however, called his attention very emphatically to what he had done and made this careless individual pour a quantity of formalin over his expectoration.

It is only by repeatedly impressing upon your patients the danger of infection from coughing and sneezing without shielding the mouth and nose and the proper disposal of their sputum that any progress will be made and that these people will not be a menace to others on their return home. Your patients can be made to thoroughly understand that the use of sputum cups in public places is not objectionable. We have used them even in theaters and I have yet to see any one of the audience get up to leave because their seat mate made use of one of these receptacles.

Dr. Slater: We can send a man to a medical college, but we cannot make a physician of him. Again you will find men who make good

students, but not successful practitioners. The same is true with regard to the sanatorium. We have those patients who are always breaking the rules and failing to observe precautions (often making it necessary to discharge them), then there are those who do everything possible to observe the rules and make ideal patients while in the sanatorium; even these after leaving will often discard what they have been taught. This is presumably due to the fact that they know of others, even those having tuberculosis who expectorate promiscuously and otherwise do not take precautions to prevent the spread of the disease. Just this morning on leaving the tube, the first thing I saw was a corner on the sidewalk where a number of expectorations had been made, in fact it looked as if it might have been provided for that purpose; no doubt many of these deposits contained tubercle bacilli. Naturally tuberculous patients seeing such an act of carelessness on the part of others feel that they can do likewise without additional danger.

Dr. McSweeny: I am inclined to believe that the anti-tuberculosis campaign has had more effect in raising the general standard of hygiene than on the disease itself. Dr. Coolidge has just said for the second time that he does not think the members of this Association need instruction on the point under discussion, but I cannot agree with him, for I think we all need to be constantly reminded to constantly remind the patients who constantly forget. One of the unfortunate mistakes of the anti-tuberculosis movement, which goes right back to the beginning of it, was the accentuation of the danger of spitting as against coughing and sneezing. I presume it is too late to undo this now, but so far as is possible we all ought to attempt to add these two important factors to the admonition, even if we cannot absolutely substitute them. This is where, to my mind, Dr. Lloyd is correct about having this subject discussed before this Association.

You probably do not all agree with my point of view and it is still a moot question as to how great an importance should be attached to droplet infection. We are all more or less creatures of early prejudice, and this perhaps is why I take the stand I do, though logic and the weight of recent experimental evidence confirm it. Pflügge was one of the authorities whose works I first read when I became interested in tuberculosis. He was the great advocate, and perhaps the pioneer advocate of the importance of droplet infection, and his views have stuck to me ever since. The average person does not go round spitting, whereas everybody sneezes and coughs and, I am sorry to say, very few of them protect others while doing it. Children do not spit; women for the most part do not spit. Spitting, as we conceive it, even with such evidence as Dr. Slater spoke of, is nevertheless a small and even infinitesimal danger as compared with the danger of droplet infection.

Just about when we had come to the conclusion that there were no such things as air-borne diseases, we have suddenly realized that some of the diseases most important from an economic standpoint probably are air-borne; the common cold and influenza, for instance; and we combat

these also when we fight against droplet infection in tuberculosis; whereas it is altogether improbable that sputum is of any consequence in their spread, for, susceptible as tubercle bacilli are to light and sun and desiccation, those other infections are certainly much more so.

Dr. Knopf: Why not come to some definite conclusions? All health departments have notices forbidding spitting on the floor and elsewhere Would it not be well to recommend the insertion of a clause asking that all persons hold their handkerchief or at least their hands before their mouths when coughing? I have been impressed by the fact that in our crowded street cars where it is forbidden to expectorate on the floor, the ordinance is obeyed with fair conscientiousness, but the public should also be given some idea of the danger of spreading infection by coughing and be requested to refrain from letting disease be spread by droplet infection.

Dr. Bowditch: Such resolutions should be considered very carefully before being presented.

Dr. Washburn: Once during the course of an examination of a factory in connection with some work on industrial hygiene, which I was doing for the State Board of Health of Massachusetts, I asked the foreman, who was vigorously chewing tobacco, whether there was much spitting upon the floors of the mill. After expectorating copiously upon the floor he calmly said, "No, very little," thereby illustrating that with some persons, spitting is an unconscious habit.

Dr. Rosenberg: May I suggest that the question of sneezing might well be added?

The meeting was then adjourned.

ELEVENTH SPRING MEETING OF THE AMERICAN SANATORIUM ASSOCIATION

The Eleventh Spring Meeting of the American Sanatorium Association was held in the Willard Hotel, Washington, D. C., at 9 P. M.

The meeting was called to order by the president, Dr. Vincent Y. Bowditch. The reports of the secretary and treasurer were read and accepted.

Following the appointment by the president of Drs. Washburn, Rathbun, and Barnes as a nominating committee, the officers for the ensuing year were elected as follows:

Dr. Vincent Y. Bowditch, President.

Dr. Lawrason Brown, Vice-President.

Dr. Edward S. McSweeny, Secretary and Treasurer.

The report of the committee (composed of Drs. Brown, Lyman, and Coon) as to the importance of urging further instruction in medical schools on the subject of tuberculosis was then presented. After discussion, it was deemed wiser to leave the matter to the organized movement of the National Association, which was already taking steps in that direction.

Dr. Knopf was again appointed a committee of one as to public spitting signs and ordinances.

Drs. Rathbun, Brown, and Washburn, as a committee on the revision of classification of cases, presented their report through Dr. Rathbun, the chairman. The committee recommended one or two slight changes in the present classification while recognizing the importance of keeping any such classification as simple as possible and the impossibility of making any classification which would be satisfactory to every one. After prolonged discussion, it was voted that the scheme suggested by the committee should be placed tentatively before the members of the society and tried before the winter meeting; the subject then to be more fully discussed before presenting any changes in the classification to the National Association.

After discussion as to the proposed amendment relative to life members, it was voted that formal notice be mailed to all members of the association that at the next meeting a change in the by-laws will be proposed in regard to "life members."

It was asked that the December meeting be held at the Mt. McGregor Sanatorium at the invitation of the Metropolitan Life Insurance Company.

Owing to the fact that the meeting was held at the time of the Triennial Congress and that most of the members prefer at such times to visit the sessions of other societies, no scientific discussions were carried on at this meeting, which adjourned at 10 P. M.

The National Association for the Study and Prevention of Tuberculosis

CONSTITUTION AND BY-LAWS

LIST OF MEMBERS

September 15, 1916

CONSTITUTION AND BY-LAWS

CONSTITUTION

Article I — Name

The name of this Society shall be The National Association for the Study and Prevention of Tuberculosis.

Article II — Objects

The objects of the Association shall be: (*a*) The study of tuberculosis in all its forms and relations; (*b*) the dissemination of knowledge concerning the causes, treatment, and prevention of tuberculosis; (*c*) the encouragement of the prevention and scientific treatment of tuberculosis.

Article III — Meetings

The meetings shall be held at such times and in such places as may be directed under the By-Laws.

BY-LAWS

Article I — Membership

This Association shall consist of three classes of members: (*a*) Members; (*b*) Life Members; (*c*) Honorary Members.

(*a*) Those persons who participated in the organization of the Association at the meeting in Philadelphia on March 28, 1904, and such persons as shall from time to time be elected by the Board of Directors shall be Members so long as they comply with the provisions of the By-Laws. The dues of Members shall be Five Dollars ($5) a year.

(*b*) Members may become Life Members upon the payment of Two Hundred Dollars ($200).

(*c*) Persons distinguished for original researches relating to tuberculosis, or eminent as sanitarians, or as philanthropists, who have given material aid in the Study and Prevention of Tuberculosis may be elected Honorary Members.

Article II — Board of Directors

Section 1. The Association shall, at its first meeting, elect a board of thirty directors, divided into five groups of six each, to serve one, two,

three, four, and five years, the duration of office to be determined by lot; thereafter, retiring directors, who have served a full term of five years, shall not be eligible for re-election the year of retirement; provided, however, that this restriction shall not apply to the secretary or treasurer.

The Board of Directors may hereafter, at the annual meeting or at a special meeting of the Association, be increased to at least sixty, the additional members to be divided into groups in accordance with the provisions of the preceding paragraph of this section and subject to the same restrictions. It is furthermore provided that at least one-third of the total membership of the Board shall consist of laymen. At annual meetings succeeding the increase of the Board of Directors to a membership of sixty, twelve directors shall be elected for terms of five years, or, in case of vacancies in any of the groups, for such unexpired terms. The Board of Directors may, at its discretion, fill any or all vacancies caused by death, removal, resignation, etc., for the unexpired term, at a regular meeting of the Board, provided that proper notice specifying the vacancies to be filled be given to each member of the Board at least twenty days in advance of the meeting.

SECTION 2. The Board of Directors shall make its own rules; the government of the Association, the planning of work, the arrangement for meetings and congresses, and all other matters appertaining to legislation and direction shall be in its hands; committees shall have the power to execute only what is directed by the Board.

ARTICLE III — ELECTION OF OFFICERS

The Board of Directors shall annually elect from its own number a President, two Vice-Presidents, a Secretary, and a Treasurer, who shall be the officers of the Associations as well as of the Board.

ARTICLE IV — COMMITTEES

SECTION 1. The Board of Directors shall appoint an Executive Committee of seven directors, of which the President and the Secretary shall be members *ex officio*, to which shall be entrusted all the executive work of the Association.

SECTION 2. The Board of Directors is empowered to appoint representatives on the International Committee on Tuberculosis; it shall also from time to time appoint such committees as may be necessary for scientific and educational work, and for the holding of meetings and congresses.

ARTICLE V — QUORUM

Seven Directors shall constitute a quorum of the Board of Directors.

ARTICLE VI — MEETINGS

There shall be at least one stated annual meeting of the Association at a time and place to be fixed by the Board of Directors. Other meetings

of the Association may be called by the Board at such times as it shall deem proper. The Executive Committee shall hold stated and other meetings as may be directed by the rules of the Board of Directors.

Article VII — Moneys

The moneys received from membership dues and from all other sources shall be used for defraying the expenses of the Association, and for furthering its objects under the direction of the Board of Directors.

Article VIII — Amendment of Constitution

Propositions to amend the Constitution may be presented in writing at any meeting of the Board of Directors or of the Association; they shall be then referred to the Board of Directors for consideration and report. The Board of Directors shall report all propositions for amendment, whether submitted to it originally or by reference, at the meeting of the Association next following, when action may be taken; *provided, however,* that no proposition for amendment shall be voted upon within thirty days after its presentation, or without at least twenty days' notice of the meeting at which it is to come up for consideration, which notice shall set forth the proposed amendment in full. An affirmative vote of two-thirds the members present shall be required for adoption.

Article IX — Amendment of By-Laws

By-Laws may be amended in the same manner as the Constitution or by a two-thirds vote of the members present at a meeting of the Board of Directors, provided that in the latter case the proposition to amend has been presented in writing at a previous meeting of the Association, or of the Board of Directors, and that subsequently to such presentation twenty days' notice in writing has been given of the proposed amendment in the call for the meeting.

Article X — Advisory Council

The Advisory Council of The National Association for the Study and Prevention of Tuberculosis shall consist of:

First. Directors of the Association.

Second. Officers or representatives appointed by various recognized State associations for the prevention of tuberculosis, such representatives being required to qualify as members of the National Association, the number in any case not to exceed five.

Third. Officers or representatives of various recognized local or municipal associations for the prevention of tuberculosis, such representatives being required to qualify as members of the National Association, the number in any case not to exceed three.

Fourth. A member of the medical staff of every public hospital or sanatorium for the exclusive care of tuberculous patients, such member

to be designated by the board of trustees or other authorities of the hospital or sanatorium, such representative being required to qualify as a member of the National Association.

Fifth. A representative from the board of trustees or other executive authorities of approved hospitals or sanatoria for the exclusive care of tuberculous patients, such representative being required to qualify as a member of the National Association.

Sixth. Representatives of recognized, incorporated charitable societies or associations, such representatives being required to qualify as members of the National Association, the number in any case not to exceed three.

Seventh. The president or medical officer of the Health Department of any State or any city with a population of more than twenty thousand may become *ex officio* a member of the Advisory Council during his term of office.

The Advisory Council shall meet at the time of the annual meeting of the Association, and at such other times as it may be called together by the Directors or the President of the National Association. During the meetings of the National Association the Advisory Council shall have regular stated meetings at which members of the Council may bring up for discussion, or may present papers, which have been approved, bearing on the administrative control of tuberculosis, the management of hospitals and sanatoria, may make recommendations to the Board of Directors with regard to the conduct of the National Association, and other related subjects.

GEOGRAPHICAL LIST OF MEMBERS

LIFE MEMBERS

Blumenthal, George, New York.
Carnegie, Andrew, New York.
Clark, F. A., New York.
Fisk, Harvey Edward, New York.
Frick, Henry C., New York.
Harkness, Edward S., New York.
Henszey, William P., Philadelphia.
Higginson, Henry L., Boston.
Knickerbacker, Mrs. H., New York.
Knopf, Dr. S. Adolphus, New York.
Langdon, Woodbury G., Morristown, N. J.
Lea, Henry C., Philadelphia.
Lewisohn, Adolph, New York.
McCormick, Cyrus H., Chicago.
Macy, V. Everit, New York.
Maloney, Martin, Philadelphia.
Marshall, Louis, New York.
Mather, Samuel, Cleveland.
May, Francis E., Chicago.
Phipps, Henry, New York.
Rockefeller, John D., New York.
Schiff, Jacob H., New York.
Wanamaker, Rodman, Philadelphia.
Warburg, Felix M., New York.

GEOGRAPHICAL LIST OF THE MEMBERS OF THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS, SEPTEMBER 15, 1915

ALABAMA

ANDREWS, DR. GLENN, Montgomery, Ala.
BAKER, DR. J. N., Montgomery, Ala.
CARY, DR. C. A., Alabama Polytechnic Institute, Auburn, Ala.
EAVES, REV. GEORGE, Secretary, Anti-Tuberculosis Association of Jefferson County, 311½ South 20th Street, Birmingham, Ala.
GRAHAM, JOHN Y., President, Anti-Tuberculosis Association of Tuscaloosa County, Tuscaloosa, Ala.
LEWY, MISS PAULINE, Secretary, Montgomery Anti-Tuberculosis League, 408 Bell Building, Montgomery, Ala.
LULL, DR. CABOT, 1004 Empire Building, Birmingham, Ala.
MCCALL, DR. DANIEL T., Mobile, Ala.
SANDERS, DR. W. H., State Health Officer, Montgomery, Ala.
WILSON, DR. CUNNINGHAM, 1107 South 20th Street, Birmingham, Ala.

ARIZONA

BRYAN, DR. W. G., Box 1192, Bisbee, Ariz.
CLARK, WILL L., Jerome, Ariz.
FLINN, DR. JOHN W., Pamsetgaaf among the Pines, Prescott, Ariz.
FLINN, MRS. JOHN W., Prescott, Ariz.
JAMES, DR. H. J., Medical Director, St. Luke's Home, Phoenix, Ariz.
MARDEN, DR. A. E., United States Indian School, Phoenix, Ariz.
METZGER, DR. JEREMIAH, Tucson-Arizona Sanatorium, Tucson, Ariz.
WATSON, DR. SAMUEL H., Tucson-Arizona Sanatorium, Tucson, Ariz.
WILKINSON, H. B., Phoenix, Ariz.
WILSON, DR. A. D., Prescott Cottage Sanatorium, Prescott, Ariz.
YOUNT, DR. C. E., Prescott, Ariz.

ARKANSAS

AUERBACH, MURRAY A., Secretary, Arkansas Society for the Study and Prevention of Tuberculosis, City Hall, Little Rock, Ark.
HILTON, DR. R. A., El Dorado, Ark.
STEWART, DR. JOHN, Arkansas Tuberculosis Sanatorium, Booneville, Ark.

CALIFORNIA

ALLEN, DR. H. W., 240 Stockton Street, San Francisco, Cal.
AYER, HAROLD O., 5 Westmoreland Place, Pasadena, Cal.
BAGG, DR. C. P., 1024 Arapahoe Street, Los Angeles, Cal.
BARLOW, DR. W. JARVIS, 616 Security Building, Los Angeles, Cal.
BECKETT, DR. W. W., Pacific Mutual Life Insurance Company, Los Angeles, Cal.
BETHELL, MISS CORA M., Secretary, Santa Clara County Association for the Study and Prevention of Tuberculosis, 19 South 3rd Street, San José, Cal.
BINE, DR. RENÉ, 350 Post Street, San Francisco, Cal.
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